

DOCUMENT RESUME

ED 454 071

SE 064 937

AUTHOR Ohland, Matthew W., Ed.; Anderson, Tim J., Ed.
TITLE SUCCEED (Southeastern University and College Coalition for Engineering Education) Annual Report, Year 8.
INSTITUTION Southeastern Univ. and Coll. Coalition for Engineering Education.
SPONS AGENCY National Science Foundation, Arlington, VA.
PUB DATE 2000-04-30
NOTE 78p.
PUB TYPE Reports - Descriptive (141)
EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Cooperation; *Curriculum; Data; Educational Change; *Engineering Education; *Evaluation; Higher Education; *Marketing; Mentors; Problem Solving; Professional Development; Technology

ABSTRACT

This document presents the Year 8 Annual Report of the Southeastern University and College Coalition for Engineering Education (SUCCEED). Contents include: (1) Executive Summary; (2) Response to Recommendations of Prior Review Teams; (3) Major Accomplishments; (4) Faculty Development; (5) Outcomes Assessment; (6) Student Transitions; (7) Technology-Based Curriculum Delivery; (8) Dissemination; (9) Assessment; (10) Industrial Involvement; and (11) Budget Information. Appendices include a glossary of acronyms and references. (Contains 214 references.) (YDS)

SE

ED 454 071

SUCCEED

SOUTHEASTERN UNIVERSITY AND COLLEGE
COALITION FOR ENGINEERING EDUCATION

Year 8 Annual Report

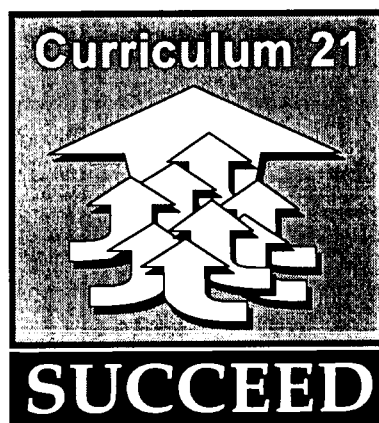
April 30, 2000

PERMISSION TO REPRODUCE AND
DISSEMINATE THIS MATERIAL HAS
BEEN GRANTED BY

M. Orland

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)

1



U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as
received from the person or organization
originating it.

☐ Minor changes have been made to
improve reproduction quality.

• Points of view or opinions stated in this
document do not necessarily represent
official OERI position or policy.

An NSF Engineering Education Coalition

*Clemson University - Florida A&M University - Florida State University
Georgia Institute of Technology - North Carolina A&T State University
North Carolina State University - University of Florida
University of North Carolina at Charlotte
Virginia Polytechnic Institute and State University*

BEST COPY AVAILABLE

Table of Contents

| | |
|--|----|
| A. Executive Summary | 3 |
| B. Response to Recommendations of Prior Review Teams | 4 |
| C. Major Accomplishments | 6 |
| D. Faculty Development | 13 |
| E. Outcomes Assessment..... | 19 |
| F. Student Transitions..... | 23 |
| G. Technology-Based Curriculum Delivery | 34 |
| H. Dissemination..... | 39 |
| I. Assessment..... | 42 |
| J. Industrial Involvement | 46 |
| K. Budget Information | 48 |
| Appendix I. Glossary of Acronyms | 65 |
| Appendix II. References | 66 |

A. Executive Summary

The most critical responsibility of SUCCEED is to develop a cadre of faculty who are engineering education innovators. Many other goals, even the recasting of tenure and promotion criteria to give adequate recognition to educational scholarship (often viewed as an intractable problem), will be made simple if this community becomes sufficiently large and strong. We are confident that, partly due to our efforts, the engineering education research community has strengthened in the past decade. The improvement in quality and quantity of educational scholarship in engineering is clear from review of the Journal of Engineering Education and various conference proceedings, most notably those of the American Society of Engineering Education. In this report, we pay special attention to a number of ways we observe that community developing within SUCCEED.

Authors from SUCCEED Institutions contributed six articles to the Journal of Engineering Education in the past year—the number increases to 10 if we count contributions from SUCCEED's Council of Schools members. Contributions from other Coalition schools are also notable—a sign that the Coalitions program as a whole is contributing to the desired effect. Another measure is the ability of SUCCEED faculty to obtain other funding for their educational research—over \$9 million in grants to continue or extend educational research has already been identified from industrial, government, or foundation sources. Another \$747,600 has been given by industrial concerns as cash or in-kind contributions in situations where a return is expected (e.g., design projects with deliverables). In addition to cash support, students on such projects commonly work with a liaison provided by the company—a significant value that has not been estimated in these figures. While some of this support is difficult to document, the significant amount noted is a clear indication of lasting change.

Supporting our success are the demonstration of cost effectiveness and benefit, wide dissemination through our Council of Schools (COS), our web page, Volume II of "SUCCEED's Greatest Bits" CD-ROM, journal and conference publications, workshops, and presentations in a variety of venues. Our mission is still to institutionalize our curriculum model and disseminate it beyond the Coalition. While we have developed our expertise through the enhanced communication possible with our Coalition Focus Team / Campus Implementation Team matrix organization in the past, we recognize the possibility for improvement and anticipate some restructuring of SUCCEED's management to best take advantage of the opportunities that lie ahead. Especially as SUCCEED nears completion of its milestones, we must shift more of our attention to our dissemination mission.

SUCCEED's community of engineering education researchers is improving the United States engineering education system in a number of ways. Our broad spectrum of innovative products and processes, driven by enhanced dissemination efforts, is expected to have a significant impact on the nation's engineering education system.

B. Response to Recommendations of Prior Review Teams

Since the NSF issued no recommendations after the submission of our previous annual report, this report will focus on our response to recommendations from SUCCEED's External Advisory Board based on a review of the Coalition's plans on March 27, 2000, as indicated in EAB Chair Barry Diamondstone's letter of April 19. Responses are in italics.

- Clearly identify individuals on the Guidance team who will be responsible for coordinating the assessment and dissemination efforts during these last years. *While the restructuring discussed in the updated strategic plan is not yet complete, we have identified Carl Zorowski (former SUCCEED Director) to build an expanded dissemination team. We have also asked Bob Serow to lead a summary assessment project that reports directly to the Guidance Team.*
- The [CIT-level assessment person should] be a full-time employee of the school, even if only a portion of the person's efforts are devoted to SUCCEED. *While the restructuring discussed in the updated strategic plan is not yet complete, we feel that adequate accountability will be achieved by making a full-time employee responsible for the assessment and in some instances providing them with the resources to support a graduate student to perform the day-to-day duties.*
- Prioritize [the] list of areas of expertise... focus over the remaining years of the program should be on 3-5 areas. *We have not yet come to consensus on the "expert" model presented to the EAB. As discussions continue, we will take this recommendation into consideration.* First priority for dissemination of SUCCEED products and services should be given to the Council of Schools and the academic partners to SUCCEED. *In that we already have a relationship with the Council of Schools members, we agree that our dissemination efforts are best spent working with those schools. We also believe it is critical that we take advantage of any dissemination opportunity to any school as the opportunity arises, to ensure the broadest possible dissemination. This recommendation is most relevant in how we allocate our dissemination spending.*
- If SUCCEED focuses on completing its dissemination to its Council of Schools and academic partners, [a marketing] effort may not be needed. If...a marketing effort is needed...solicit the assistance of marketing professionals in order to ensure that these efforts are properly focused on the intended customers. *Cathy Brawner, who has performed qualitative assessment for SUCCEED, also has marketing expertise. She will develop a marketing and promotional plan and coordinate with external providers of marketing services for creative and production assistance.*
- Explore opportunities for inter-coalition efforts such as nationally normed tests of achievement or other follow-up activities, taking advantage of the lessons learned. *SUCCEED has been a leader in promoting inter-coalition activities and will do so in such proposed areas as a coalition wide CD and workshop conference. A number of SUCCEED researchers have noted the Foundation Coalition's use of nationally normed tests. Future partnering efforts will seek to draw on Foundation's expertise with such instruments.*

- Aim all activities during the remaining years at leaving a legacy that fulfills their original mission of providing sustainable, systemic curriculum reform. *This is one of our foremost considerations in restructuring SUCCEED's management. The Y7 report clearly demonstrates significant successes in identifying alternate sources of educational research funding.*

C. Major Accomplishments

SUCCEED has had another very successful year, yielding a wide range of accomplishments across all of our functional teams. We have started to compile a list of follow-on funding obtained by SUCCEED investigators to continue or extend their work—the list is certainly not complete, but the list is impressive even in draft form. Also among the notable accomplishments is the large number and variety of opportunities for faculty development.

“I wanted to commend you and all the attendees of the [event] last night... I counted 32 folks who were interested... to discuss ways to improve our CoE teaching / learning environment. The discussion was great—it even continued in the hallway after the meeting as well as this morning on the way in from the parking lot.”
– Engineering Learning Community participant

SUCCEED’s leaders in the Faculty Development area, Richard Felder and Rebecca Brent of NC State, are widely recognized as experts in the area of effective teaching. Their leadership has helped drive faculty development at SUCCEED’s member institutions to a new level—Georgia Tech was named the winner of the 1999 Theodore M. Hesburgh Award for Faculty Development to Enhance Undergraduate Teaching and Learning given by TIAA-CREF. This award was given in 1997 to Virginia Tech’s Faculty Development Institute.¹ In Georgia Tech’s case, the award honors an advanced faculty development program that includes endowed teaching fellowships for junior and senior faculty, orientation programs for new faculty, and a “Faculty of the Future” program for Ph.D. students interested in academe.

At Clemson, the number of WebCT courses and student accounts has grown from 50 and 3,000 in the fall of 1998 to 200 and 12,000 in the spring of 2000. In the past year, 18 workshops have been held to train faculty and graduate teaching assistants. Clemson also completed an assessment of the program initiated in Fall 1998, the results of which were overwhelmingly positive. The College of Engineering and Science expects to propose that entering CES freshmen be required to own a laptop beginning with the class of 2001. The combination of a WebCT environment and the infrastructure afforded by the laptop requirement promotes the implementation of a technology-enhanced curriculum.

UNC Charlotte strives to reduce the response time for continuous improvement by automating many outcomes assessment processes. Using ASPIRE, administrators can view the academic plans and annual reports of academic departments and support units in a side-by-side format. FACTS, a Faculty Activities Tabulation System, helps faculty and administrators keep track of a wide range of faculty activities. The use of an electronic grading system that successfully handled grading of approximately 600 students in Fall 1999 is preliminary to a decision to move to a portfolio system for students. A documentation system for tracking data-driven improvement consists of a database to track the student learning outcomes described in criterion 3 of ABET EC 2000, and is menu driven. These various electronic data systems allow faculty, administrators, and students easy access to data in a variety of forms, shortening the improvement cycle.

Multidisciplinary design is still a strength at SUCCEED institutions. A new multidisciplinary capstone design project at North Carolina A&T in spring 2000 formed a team of mechanical and electrical engineering students are designing, building and testing a system that will unwind a material from one spool to another with the material under a constant safe tension. A particularly interesting aspect of the project, under the supervision of Samuel Owusu-Ofori, is that two independent teams work on the project, where the second team must take input from the first team in order to complete its objective. Yousef Haik of the FAMU-FSU College of Engineering has established the Multidisciplinary Design and Training Clinic, which provides the infrastructure to take projects that have roots in industry and integrate them with courses and capstone design projects using integrated teams from different engineering disciplines. An infrastructure and foundation space was provided by the College, including basic workspace for four teams to work simultaneously. The University of Florida's Integrated Product and Process Design program is still going strong, with only a small amount of SUCCEED funds. The 24 program sponsors pay support of \$15,000 per project to engage 137 students from 9 disciplines in 27 multidisciplinary capstone design projects. Each design project is aided by a liaison from the company and one of 21 faculty coaches.

Follow-on funding

We have always recognized that a critical part of SUCCEED's legacy must be the development of a cadre of engineering faculty engaged in educational research and scholarship. SUCCEED is in the process of compiling an extensive publication list that will demonstrate the level to which we have established a community of scholarship. Another excellent measure of how we are achieving this objective is the amount of funding secured by SUCCEED investigators from other sources to continue or extend the educational research initiated with SUCCEED funding. It has always difficult to document such successes, but this section of the report represents to record those of which we have become aware.

| Grant title and period | Agency, award | Principal Investigators | Support |
|---|----------------------|---|----------------|
| "A Longitudinal Study of Programs at Eight Engineering Colleges using the SUCCEED Longitudinal Database," 8/1/98-7/31/00 | NSF, DGE-9809663 | Matthew W. Ohland, University of Florida | \$102,000 |
| "Development of instructional systems for teaching an electricity and magnetism course for engineers," 3 years ^{2,3} | NSF, DUE-9455470 | Edward Thomas, Georgia Tech | \$242,000 |
| "Freshman Laboratory for Product and Process Engineering," 1996-1997 | NSF, DUE-9559927 | David F. Ollis, North Carolina State University | \$200,000 |

| Grant title and period | Agency, award | Principal Investigators | Support |
|---|--|--|---|
| “Chemical engineering laboratory in electronic and Photonic Devices,” 1999 | Dreyfus Foundation, SG-00-031 | David F. Ollis, North Carolina State University | \$30,000 |
| Online Degree program in Electrical Engineering | Sloan Foundation | Haniph Latchman, University of Florida | \$135,000 |
| ExCEED—Excellence in Civil Engineering Education, 1999-2002 | American Society for Civil Engineers | Marc I. Hoit, University of Florida | \$300,000 / 2 years |
| “Hands-On Institute for Science and Technology,” February, 1995 | American Society for Civil Engineers Committee on Equal Opportunity Programs | Marc I. Hoit and Matthew W. Ohland, University of Florida | \$3,200 |
| “Freshman Practical Engineering Laboratory,” ^{4,5,6,7} 1998 | Virginia Tech’s Student Engineering Council | M.H. Gregg, R.M. Goff, O.H. Griffin, P. Devens, Virginia Tech | \$10,000 |
| “Hands-On and Early Design – Practical Engineering, Full Integration,” ^{8,9} 2000 | Virginia Tech’s Student Engineering Council | R.M. Goff, M.H. Gregg, J.Connor, Virginia Tech | \$12,000 |
| Online Course Development | Virginia Tech Center for Innovation in Learning | Electrical and Computer Engineering faculty, Virginia Tech | \$205,000 |
| “TALENT 21 - Gateway for Advancing Science and Mathematics Talent,” Oct 1, 1999 - Sept 30, 2004 | NSF HBCU-UP | Cesar Jackson, Aaron Titus, Alvin Kennedy, Guoqing Tang, Glenda Scales, Mary Smith, Sanjiv Sarin, Alexanderia Kurepa, NC A&T State | \$2,999,985 (\$599,997 per year for 5 years) |
| Horizontal Integration | US Army | Daniel P. Schrage, Georgia Tech | Over \$1,000,000 |
| Introduction to Engineering / Freshman Physics | Hewlett-Packard | NC State | Equipment \$250,757 |
| College of Engineering Teaching Day | Alcoa | UNC Charlotte | \$2,000 |
| “EMPACC (Engineering, Mathematics, Physics and Chemistry Coalition) Scholars Program” | Office of Naval Research | Eric A. Cheek (PI) and Caesar Jackson, NC A&T | \$1,365,000 |

| Grant title and period | Agency, award | Principal Investigators | Support |
|--|---|---|------------------------|
| “Application of Hierarchical Cognitive Model to Education of Undergraduate Engineering Students” ¹⁰ | NSF CCLI | D. Hirt (PI), D. Bruce, C. Gooding, J. Haile, S. Husson, S. Kilbey, R. Rice, and D. Switzer, Clemson University | \$349,550 over 3 years |
| UF minority student programs | Lockheed-Martin (endowment) | Jonathan F.K. Earle, University of Florida | \$400,000 |
| NC State University Center for Minority Engineer Development | BP Amoco Foundation | Tony Mitchell, NC State | \$150,000 / 3 years |
| Multidisciplinary / International project | Boeing | James Marchmann, III, Virginia Tech | \$125,000 |
| Virginia Tech Advanced Student Project Laboratory | Joseph A. Ware (private donation) | College of Engineering, Virginia Tech | \$600,000 |
| | NSF GK-12 | Laura Bottomley, NC State | \$273,027 / 3 years |
| | Lucent Technologies Foundation | Laura Bottomley, NC State | \$5,000 / 2 years |
| Freshman Project Lab | Raymond and Violet Frith (private donation) | College of Engineering, Virginia Tech | \$250,000 |

Workshops, conferences, and seminars

It has always been clear that the funding the NSF provides to SUCCEED is a catalyst—that NSF funding alone will not provide sufficient resources to cause the desired reform. As a result, many of our Principal Investigators (PIs) from the first five years and those who are members of SUCCEED teams devote considerable amounts of their time sharing our vision and innovations and learning about the innovations of others. The table below lists as concisely as possible the wide variety of ways we are aiding faculty development in and beyond SUCCEED. These are in generally in chronological order, including a few future dates and some events that missed last year’s report. Note that certain campuses are not used as frequently for Coalition-wide events—this is due to the significantly higher cost associated with traveling to some of our institutions.

| Event description | Date of event | Location (see list of acronyms) | Number attending | Attendee population (see acronym list) |
|---|----------------------|--|-------------------------|---|
| Designing Effective Web Sites for Teaching and Learning | April 1999 | Clemson | 18 | ASEE/SE conference attendees |

| Event description | Date of event | Location (see list of acronyms) | Number attending | Attendee population (see acronym list) |
|---|----------------------|--|-------------------------|---|
| Articulation Conference | 4/30/99 | Virginia Tech | 24 | Local campus / community coll. |
| Teaching Celebration Day | 5/99 | UNCC | 50 | Local campus |
| Lectures On-Demand Using Synchronized Streaming Media | 5/28/99 | FAMU-FSU | 18 | SUCCEED / COS |
| Bridging the Communication Gap workshop | 6/3-5/99 | University of Florida | 25 | SUCCEED / COS / Gateway / other |
| National Effective Teaching Institute | 6/17-19/99 | Charlotte, NC | 50 | US Faculty |
| ASEE Annual Conference and Exhibition | 6/20-23/99 | Charlotte, NC | 129 | SUCCEED delegation |
| Faculty Development Institute | Summer 1999 | Virginia Tech | 45 | COE participants in University program |
| Annual Engineering Faculty workshop | 7/16/99 | FAMU-FSU | 31 | Local workshop |
| Teaching Effectiveness Workshops 3-part series | Fall 1999 | Clemson | | Local campus |
| Orientation to Teaching Workshop | 8/18/99 | University of Florida | 14 | New faculty |
| New Faculty Orientation | 8/16-18/99 | Georgia Tech | | New faculty |
| Orientation to Teaching | | Clemson | | New faculty and graduate students |
| Effective Teaching Workshop | 8/20/99 | University of Florida | 38 | UF, FAMU-FSU, COS faculty |
| Orientation Teaching Workshop | 8/27-28/99 | NC State | | New faculty and graduate students |
| COE-Teach: Classroom assessment techniques | 8/30/99 | NC State | | Learning community |
| Mentoring and Supporting New Faculty Members | 8/31/99 | Clemson | 37 | Administrators, chairs, senior faculty |
| Effective Teaching with Technology | 9/16/99 | Georgia Tech | | Local faculty |
| Satisfying ABET Engineering Criteria 2000 for Employer Feedback | 9/17-18/99 | Charlotte, NC | 34 | SUCCEED / COS |
| COE-Teach: Why Can't Students Communicate — Or Can They? | 9/27/99 | NC State | 34 | |

| Event description | Date of event | Location (see list of acronyms) | Number attending | Attendee population (see acronym list) |
|--|----------------------|--|-------------------------|---|
| Principles of Good Practice in Science and Engineering Education | 9/29/99 and 9/30/99 | Virginia Tech | 62 | Local workshop |
| Advanced Synchronized Streaming Media workshop ¹¹ | 10/4-5/99 | Virginia Tech | | |
| Effective Teaching Workshop | 10/7/99 | Georgia Tech | | Local faculty |
| Council of Schools visit | 10/18-19/99 | SIUC | 29 | SUCCEED / COS |
| Streaming Media/Content Capture | 10/21/99 | Georgia Tech | | Local faculty |
| COE-Teach: Web Sites You Can Use | 10/25/99 | NC State | 34 | |
| Mentoring and Supporting New Faculty Members | 11/16/99 | NC State | 20 | Administrators, chairs, senior faculty |
| Intellectual Property & Ethical Issues Related to Teaching with Technology | 11/18/99 | Georgia Tech | | Local faculty |
| Engineering Learning Community meeting | 11/18/99 | Virginia Tech | 32 | Learning community |
| Faculty Mentoring | 12/2/99 | Georgia Tech | | Local faculty |
| Showcase of Campus Uses of Instructional Technology | 12/16/99 | Georgia Tech | | Local faculty |
| EC2000 Criterion 2: Writing Program Educational Objectives | 12/16/99 | NC State | 12 | |
| Faculty Mentoring | 1/20/00 | Georgia Tech | | Local faculty |
| Student Expectations | 2/1/00 | Georgia Tech | | Local faculty |
| Cooperative & Active Learning | 2/17/00 | Georgia Tech | | Local faculty |
| Assessment Techniques for the Classroom | 3/16/00 | Georgia Tech | | Local faculty |
| COE-Teach: The Scholarship of Teaching | 2/28/00 | NC State | 34 | |
| Engineering Learning Community meeting | 3/9/00 | Virginia Tech | 22 | Learning community |
| Distance Learning Classroom Open House ¹² | 3/20/00 | FAMU-FSU | | Local workshop |

| Event description | Date of event | Location (see list of acronyms) | Number attending | Attendee population (see acronym list) |
|--|----------------------|--|-------------------------|---|
| COE-Teach: Designing Engineers | 3/27/00 | NC State | 34 | |
| Share Our Future: SUCCEED / Gateway Conference | 3/28-29/00 | Greensboro, NC | 129 | SUCCEED / Gateway / other Coalitions |
| ASEE/SE section conference | 4/2000 | | | SUCCEED delegation |
| Teaching with Technology in the College of Engineering | April 2000 | NC State | | Local faculty |
| Teaching with Cases: Benefits and Challenges | 4/5/00 | Virginia Tech | 36 | Local campus |
| Undergraduate Research: Is it Worth the Effort? | 4/7/00 | Clemson | | Local campus |
| Articulation Conference | 4/21/00 | Virginia Tech | 35 | Local campus / community coll. |
| Designing a Course for On-line Delivery: A Case Study | 4/21/00 | Virginia Tech | 20 | Local campus |
| Mentoring and Supporting New Faculty Members | 4/25/00 | Virginia Tech | | Local campus |
| Teaching portfolios | 4/25/00 | UNCC | | Local campus |
| Council of Schools visit | 4/27/00 | UPR | Est. 25 | SUCCEED / COS |
| Council of Schools visit | 4/28/00 | PUPR | Est. 25 | SUCCEED / COS |
| Engineering Learning Community meeting | 5/4/00 | Virginia Tech | | Learning community |
| Active Principal Investigators and partners | Ongoing | | 585 | SUCCEED / COS |
| Teaching Leader Network | Ongoing | | 16 | Learning community |

D. Faculty Development

SUCCEED's faculty development model was presented at the 1999 ASEE Conference¹³ and will be presented again in a different form at the 2000 ASEE Conference. The model has been adopted by all the SUCCEED schools and by the participants Faculty Development Multi-Coalition Conference held in April 1999.

"His system with the computer, 'think-pair-share' learning teams, and in-class problem solving is the most effective way to learn such subject matter that I have encountered in 16 years of schooling."

***– Student in Siegfried Holzer's
Multimedia Learning Environment***

Five coalitions were represented, since not all of the coalitions have a faculty development focus. Best practices were summarized in a paper to be presented at ASEE in June and included in the conference proceedings.¹⁴ A model for new faculty support has also been developed and is being disseminated inside and outside the Coalition through Mentoring and Supporting New Faculty Workshops. This model will be presented at the 2000 ASEE Conference and an article about it will be included in the conference proceedings.¹⁵

Participation figures are available for all SUCCEED-related FD through Year 7, and are being compiled for Year 8. Matthew Ohland has taken the lead in developing and maintaining the participant database for tracking participation in all SUCCEED-related FD on the campuses—a comprehensive approach is necessary to prevent redundancy in counting faculty participation.

In the summer 1999, Rebecca Brent surveyed 9 out of 10 department chairs and all new faculty hires from the past 3 years at NC State to determine the status of support for new faculty. Most faculty reported receiving no formal mentoring and expressed a desire for it. "Mentoring and Supporting New Faculty" was developed by Rich Felder and Rebecca Brent during the spring of 1999.^{16,17} The workshop has been given to administrators, department heads, and senior faculty at Clemson (8/31/99)¹⁸ and NCSU (11/16/99).¹⁹ Virginia Tech is scheduled for a workshop April 25, 2000. The workshop has also been presented at several non-SUCCEED schools this year (University of Illinois, US Naval Academy, and University of South Florida). The Mentoring Workshop is a tool we are using to accomplish two missions. One mission is to encourage the support of new faculty as they are learning to be effective professors. The second is to help administrators and senior faculty see that new faculty will be more productive in the long run if they spend some time early on developing good teaching habits. The response to the workshops given so far has been overwhelmingly positive. The most important factor for seeing outcomes after the workshop appears to be the strong support of the dean. We will have given workshops on three of the 8 SUCCEED campuses during Year 8 and plan to give at least 3 more workshops during Year 9.

At the close of the NC State workshop, participants (20 administrators, department heads, and senior faculty) suggested a week-long orientation workshop be developed within the College for new faculty. The workshop, which will feature Gordon Lee and David Ollis on research issues and by Rebecca Brent and Rich Felder on teaching, will be held

August 7-11, 2000. They also requested summer support be provided to new faculty for their arrival on campus 2 weeks before the start of the semester; this request was approved by the dean for the summer 2000. Departments now must report on activities in support of new faculty (mentoring and other activities) to be taken into account in their annual evaluation by the dean.

As indicated above, Clemson hosted the first “Mentoring and Supporting New Faculty Members” workshop. Among the 37 attendees were 7 engineering department chairs, the Dean, and two Associate Deans. Clemson’s engineering faculty development effort is also linked to University efforts to ensure institutionalization—SUCCEED has co-sponsored events with Clemson’s Office of Teaching Effectiveness and Innovation (OTEI) and continues to collaborate with Dr. Linda Nilson, OTEI’s Director. Toward establishing an effective mentoring program, Clemson has named Dr. Melanie Cooper of the Department of Chemistry as the inaugural Faculty Teaching Fellow.²⁰

Siegfried Holzer of Virginia Tech ensures that both workshop promotion and the content of the activity are excellent. There were 62 participants at “Principles of Good Practice in Science and Engineering Education,” a Center for Excellence in Undergraduate Teaching (CEUT)-SUCCEED Workshop, including the four presenters. The presenters agreed to facilitate informal follow-up networking meetings; they will be spaced throughout the year. The workshop was promoted through: (1) a Campus-wide announcement in the CEUT FD Bulletin; (2) a message from the Dean’s office to the department heads asking them to encourage their new faculty to attend; (3) an e-mail announcement to the faculty in the college of engineering; (4) Holzer and another respected colleague contacted colleagues in engineering departments directly, gave them flyers, and asked them to attend one of the workshops and to invite potential colleagues. Holzer’s experience was that the third approach was the most effective.

Rafic Makki of UNC Charlotte developed a Faculty Handbook²¹ that includes information on promotion and tenure, research grant opportunities, teaching enhancement and teaching evaluation guidelines. The handbook was found to be useful by the new faculty members. Makki has developed workshop on teaching portfolios for junior faculty that will be given on April 25, 2000. A number of faculty enthusiastically indicated their willingness to attend the workshop. This workshop will also be videotaped and made available on-line and on-demand for UNCC faculty.

At UNC Charlotte, responses to a faculty survey gave a clear signal that the faculty development effort was too focused on teaching workshops. A few workshops have been videotaped and made available to the faculty on-demand to make sure this resource is always available to those faculty who are interested, but other approaches have been initiated. Two teaching fellows will be sponsored this summer to conduct educational scholarship activities. UNC Charlotte’s Faculty Development web site²² includes useful information on teaching improvement accessible by topic. The site is complete, but is updated regularly. Graduate students maintain the web site, which also serves to educate these students in the areas of teaching enhancement.

UNC Charlotte also initiated a “Teaching Celebration Day” in May 1999 attended by over 50 faculty members. The event widened the scope of the previous teaching awards luncheon and included a social (attended by 26 faculty) in celebration of teaching. The social was attended by the university Chancellor and involved a moderator (Dr. Al Maisto) who won the National Educator Award in 1997. Faculty from engineering actively participated in the university level teaching circle that plans and initiates teaching enhancement activities. The teaching circle gave a national workshop²³ on peer observation of teaching and published a paper in “The Chairman” periodical.²⁴ As a result of a survey of college faculty, the distribution of teaching resources such as books, handbooks, and www resources has been initiated. A study of college-wide teaching evaluations since 1994 notes a general upward trend in average teaching scores, but the trend is not yet significant.

Institutionalization of comprehensive engineering faculty development at Virginia Tech has made excellent progress. So far this year, 115 faculty have participated in events sponsored by SUCCEED; more have participated in the broader spectrum of faculty development activities. Virginia Tech’s broad faculty development support and incentive programs include:

- CEUT Instructional Enhancement Grants
- State-of-the-art computer awarded for participation in FDI summer workshop
- Provost’s Student Success Grants
- Course Development Grants from the Center for Innovation in Learning (years 6-7 funding in excess of \$ 1.7 million)
- Transforming Instructional Space Grants Program
- Teaching workshops and education conferences
- Numerous teaching excellence awards

Virginia Tech’s Engineering Learning Community (ELC)²⁵ will achieve a critical mass and replace SUCCEED as the partner of University faculty development organizations, the Center for Excellence in Undergraduate Teaching (CEUT)²⁶ and the Faculty Development Institute (FDI).²⁷ The comprehensive faculty development program will include:

- A fall initiation workshop on “Effective Learning and Teaching.”
- Follow-up faculty networking meetings to share experiences, provide support, and strengthen the learning community.
- Inter-campus networking via Internet.
- New faculty development program with focus on teaching, research, and service to include an orientation to teaching workshop, a research familiarization program, and a mentoring program modeled after the Brent/Felder workshop on “Mentoring and Support of New Faculty.”²⁸
- A graduate teaching assistant workshop and networking.
- Specialized workshops on effective teaching and technology integration.^{29,30,31,32}
- Support for attending conferences, workshops, and seminars on and off campus.

Nelson Baker reports that Georgia Tech more than doubled the percentage of College of Engineering Faculty participating in the Faculty Development activities this past year

(previous year was 19.4%; this year 47.2%). Among the faculty development activities were two seminar series the past year—one, directed at new faculty, met 3 times and the second, for all faculty, was held monthly. In April, Georgia Tech will award the first SUCCEED/College of Engineering Faculty Mentoring Award with a cash prize of \$5,000 to the mentoring pair (SUCCEED funds) and \$5,000 to the School to use to improve their mentoring activities (College of Engineering Funds). Monthly seminars/workshops for Georgia Tech faculty covered a wide range of topics.³³

Baker developed a workshop on Effective Teaching with Technology that has been shared with SUCCEED and other faculty.^{34,35} This summer we will be presenting this same information to approximately 300 teachers from across the United States who will be meeting for the 25th Conference of the SouthEastern Consortium for Minorities in Engineering (SECME). We have also begun development of a new workshop on Assessment Techniques for the Classroom,³⁶ which will be a continuing topic for next year. When we started preparing for the assessment workshop, we realized that writing objectives was poorly addressed and this was crucial to assessing engineering materials. A web site containing an Assistant for writing course objectives has also been created that will be the focus of future SUCCEED activities.³⁷ Through these activities we have reached 133 of 282 (47.2%) of the College of Engineering faculty. In so doing, we have also reached many other faculty at Georgia Tech: 57% of the College of Architecture; 76.4% of the College of Computing; 20.8% of the College of Management; 21.3% of the Ivan Allen College; and 34.7% of the College of Sciences.³⁸

“Teaching with Technology in the College of Engineering” has been planned as a one-day special topic workshop at NC State in April 2000. Tom Miller (TBCD) is taking the lead in coordinating the workshop and has lined up several presenters from NCSU College of Engineering to share their experiences with using technology in their classes. Tara Kerwin and Rebecca Brent will handle publicity. Rich Felder is assisting with the program planning. An Orientation to Teaching Workshop was held at UF in August 1999 and was opened to FAMU-FSU and COS faculty who wished to attend. Charles Glagola coordinated the workshop, and there was good attendance from UF new faculty as well as a few participants from other universities. An Orientation to Teaching Workshop was held August 27-28, 1999, at the NC State McKimmon Center for 10 faculty and 30 graduate students from the College of Engineering. A summary of the evaluations for the workshop is available.³⁹ Two teaching leaders (James Nau and Tim Clapp) presented portions of the workshop and were very well received by the participants. There will be a change in the format in Year 9 to provide a more extensive workshop for new faculty. The teaching leaders will continue to work with graduate student training.

“Rewards and Incentives for Effective and Innovative Teaching and Mentoring” has been compiled and distributed to the Deans Council (1999 EAB meeting), attendees of the mentoring session at the 1999 SUCCEED Conference, attendees of the Mentoring and Supporting New Faculty Workshops (Clemson, NCSU, University of Illinois, US Naval Academy, University of South Florida), attendees of the Felder/Brent faculty development session at the 1999 ASEE Conference, and all attendees of the 2000 SUCCEED/Gateway Conference in their notebook of materials.⁴⁰ A session on

“Evaluating and Rewarding the Scholarship of Teaching” was developed by Rich Felder and Rebecca Brent and presented at the 2000 SUCCEED/Gateway Conference.⁴¹ Guidelines for evaluating teaching scholarship are also being developed.⁴²

COE-Teach at NC State is a lunchtime discussion group that has involved 34 faculty from all departments within the College. Teaching leaders have presented sessions on a range of topics—sessions this year included

- Classroom assessment techniques (8/30/99)
- Why Can’t Students Communicate—Or Can They? (9/27/99)
- Web Sites You Can Use (10/25/99)
- The Scholarship of Teaching (2/28/00)
- Designing Engineers (3/27/00)

A total of 46 faculty have participated at least once in COE-Teach with 34 faculty attending at least one session this academic year. The closing meeting of this year will be a discussion of future directions for COE-Teach.

The faculty development effort also includes the assessment and evaluation of faculty use of innovative teaching practices and perceptions. Results of the baseline survey administered in 1998 have been published previously.^{43,44} The second administration was completed in the fall and the results are currently being analyzed by Cathy Brawner with assistance from Rod Allen. Preliminary results indicate that nearly 80% of the faculty responding have recently attended faculty development activities. Results will be compiled into a report and distributed to all CIT leaders and Deans. In addition, Rebecca Brent will present the results at the Professional and Organizational Development Network (POD) in November 2000. Additional presentations and articles will be submitted throughout the 2000-01 academic year. When compared with the 1998 survey, the results of the questions on faculty perceptions about the place of teaching quality and innovation will give us an indication of whether or not the campus climates are changing toward more recognition of education related activities.

Close ties have been established at NC State between the Faculty Center for Teaching and Learning (FCTL) and the College of Engineering FD leaders. Richard Felder served on the advisory board for the first year and a half of the center’s operation, the FCTL director, Doug Wellman, has assisted the COE in planning for new faculty workshop activities, and engineering faculty have participated in the New Faculty Seminar series sponsored by the FCTL. As FCTL expands its offering for faculty, the COE will encourage participation by engineering faculty. Doug Wellman has had a presentation in each COE workshop to tell participants about the center’s activities and will continue his involvement.

At the University of Florida, Charles Glagola established a Young Faculty Group (YFG) within the Department of Civil Engineering that meets to discuss engineering educational issues. The group has obtained support from the Department for funding of luncheons once a month with the possibility of funding other activities as the group develops them. The Department has also provided a senior mentor to provide support and guidance to the YFG. A workbook for new faculty orientation has been generated. Glagola plans to

establish a liaison from the CE Young Faculty Group who can help other engineering Departments establish similar groups. The YFG is working on a document for establishing and sustaining such groups in all COE departments. It is anticipated that an overall COE representative will be established as a coordinator for all young faculty and that support for a College-wide young faculty retreat can be established. The Orientation workbook will be refined for distribution to other Coalition Members during Summer 2000.

A detailed plan for implementation of faculty development activities at the COE level has been developed and submitted to the COE. Verbal commitment to support of the program with resources, personnel, and funding has been given by the COE. Specifically, the commitment obtained from the College of Engineering includes:

- a new faculty orientation program
- an "Excellence in Teaching" workshop
- an Effective Teaching seminar series (7-times per year) covering modules of the Effective Teaching Workshop developed by Dr. Richard Felder of North Carolina State University
- continuing support of new FD initiatives
- support for seminar series

Clemson's College of Engineering and Science has a standing Teaching Effectiveness Committee, chaired by FD Coordinator Doug Hirt.⁴⁵ The New Faculty Workshop based on the SUCCEED model was conducted for the second year (in the form of four afternoon mini-workshops). Clemson has also had several seminars on teaching, has effective links to the university Office of Teaching Effectiveness and Innovation, has instituted several faculty awards for teaching, and has clear standards and expectations for effective teaching as part of the tenure and promotion process.

E. Outcomes Assessment

In Outcomes Assessment, a mini-grant model has been adopted to focus efforts in employer feedback and portfolio use. Clemson, Georgia Tech, NC A&T, UNCC, and UFL received funding to pilot and evaluate employer feedback through surveys and focus groups, and reports on this activity are due in August, 2000. Projects are ongoing at UF and Virginia Tech to pilot the use of portfolios for collecting information relevant to ABET Criterion 3, a-k, and reports on this activity are also due in August, 2000.

A workshop on Employer Feedback and was held in Charlotte, NC, September 17-18, 1999, attended by 34 faculty.⁴⁶ A second workshop was conducted at the annual SUCCEED conference at Greensboro, NC, "Preparing for ABET EC 2000: The Complete Guide" was well attended (23 faculty) and well received.⁴⁷ The notebook prepared for this workshop will be posted to the SUCCEED web site.

At Virginia Tech, outcomes assessment efforts included conducting five focus groups of employers with 27 participants (report due in April), improving a survey of advising efforts that is distributed to seniors in April, developing a means of evaluating/assessing out-of major courses (mostly freshman courses), and conducting an ABET roundtable at the ASEE-SE section annual conference, Roanoke, VA, April 2-4, 2000.

UNC Charlotte has completed development of ASPIRE, according to Bill Shelnett.⁴⁸ ASPIRE is a program designed to show the academic plans and annual reports of academic departments and support units in the university in a side-by-side format. The format of both plans and reports parallels that required by the SACS (Southern Association of Colleges and Schools), a breakdown of the process of assessment and planning. Readers may use their web browsers to call up ASPIRE, select a department or support unit, and see these plans and results on the screen. The program allows for unit goals as well as student learning outcomes. Remaining work is to implement the system in The William States Lee College of Engineering and other volunteering departments in the spring, summer, and fall of 2000.

FACTS, UNC Charlotte's Faculty Activities Tabulation System, has been written on NT-PC and has received reviews and improvements from department chairs and selected faculty members. The program must now be ported over to the web, and tested by use in the fall semester. FACTS provides a method of storing in a database all faculty activities for a specified period of time. The system features prompted input of virtually all types of faculty activities. The system then allows summary of data from a department or unit to the chair or Dean. Once the system is on the web, faculty and department chairs will be asked to use the system to set up their vita, including annual activity records.

In the 1999/2000 academic year, an electronic grading system was used in UNC Charlotte's ENGR 1201 for most of the assignments. Undergraduate grading assistants were trained in the use of the system. The system successfully handled grading of approximately 600 students in Fall 1999 and 200 students in Spring 2000. The use of this system is preliminary to a decision to move to a portfolio system for students in The

William States Lee College of Engineering. The success of the grading system over the 1999/2000 academic year supports the idea of evolving slowly to allow faculty to require a rudimentary portfolio in the succeeding three years of these students' careers here. The next step will be to select a storage system, probably ZIP or JAZZ drives, to be installed on some subset of computers here, then allow students to maintain their own portfolios. A template for courses requiring portfolio elements and dictating formats will have to be developed. These steps will be accomplished in the 2000-2003 time frame.

UNC Charlotte has also supported development of documentation system for tracking data-driven improvement. The system consists of a database to track the student learning outcomes described in criterion 3 of ABET EC 2000, and is menu driven. For each of the a-k criteria, department secretaries or faculty members can enter the course number, term, selected measure or measures, desired target, actual measure, recommendations, comments, opportunities for improvement and results of implementation of previous instructors observations. The system provides a course assessment and improvement report which contains detailed information on the course learning outcomes measures and an ABET continuous improvement report which summarizes measures and continuous improvement actions for a given course and period of time.^{49,50}

Sanjiv Sarin of NC A&T is seeking formal approval from college faculty and the Dean for a resolution that requires all curriculum revision proposals to be justified by outcomes assessment for all engineering programs.^{51,52} Sarin also provided leadership in developing and administering several assessment instruments for all engineering programs, including Students' Evaluation of Course Contribution to Program Outcomes, Faculty's Evaluation of Course Contribution to Program Outcomes, Senior Exit Survey, Alumni Survey, Employer Survey, Senior Design Course Rating Sheet. By establishing the validity of NC A&T's college-wide Senior Comprehensive Exam, Sarin enhanced its acceptability by the college faculty as a viable assessment tool. He has also engaged in presentations and discussions on outcomes assessment and selection of assessment instruments with three programs in the college of engineering, and one presentation to all college faculty members on status of outcomes assessment activity within the college.^{53,54,55}

The Georgia Tech Assessment Seminar monthly seminar has now run two years and has provided a faculty forum for instruction and discussion in all aspects of assessment relevant to engineering education at GT.^{56,57,58,59,60} This program played a major role in establishing the GT Office of Assessment headed by Joseph Hoey. Support continues to this Office to help conduct engineering education-related assessment projects. All engineering and related programs at GT now have systematic outcomes assessment activities ongoing. These activities are being evaluated annually by College Deans in conjunction with the Office of Assessment. The Assessment Seminar has played a major role in helping units to develop, evaluate, and disseminate their methods of assessment, including capstone course evaluations, employer-related assessment, program objectives and outcomes, senior exit and alumni survey design, role of non-engineering courses in ABET a-k objectives, and curriculum revision.⁶¹ There has been an average attendance of 25 faculty per seminar. The Seminar, along with the Office of Assessment has helped develop and improve surveys of co-op employers and students related to program

outcomes, and a project with the Career Services Office to survey and interview recruiters seeking GT graduates has been initiated.⁶²

Hatice Ozturk of NC State reported on the implementation of the new EE and CpE curricula—a new curriculum has been designed to accommodate changes in the Electrical and Computer Engineering field.^{63,64,65} The members of the Course and Curriculum Committee have designed two sophomore-level courses to serve as the foundation of the new track-based curriculum. The new track based curriculum with common core, intermediate electives and senior electives will take care of many shortcomings of the earlier curriculum. To aid in planning the assessment of the new curriculum, two members of the Course and Curriculum Committee are serving on the departmental ABET EC 2000 committee.

NC State's campus outcomes assessment team has been established with departmental representatives and additional members (a faculty member from the English Department to help with procedures and a representative from the University Planning and Analysis Office to supply us with survey data and analysis). A working notebook has been prepared for the team members with material from SUCCEED workshops, departmental efforts, survey forms and ABET procedures, and team members have been trained on writing the program educational objectives in a workshop in which a written procedure and timetable were produced. The goal of the OA team is to finalize writing program educational objectives by the end of May 2000 and move on to implementation and assessment. In the remaining meetings of this semester, team members will have a mini-workshop on designing and evaluating students portfolios and they will also receive the first survey data from the University Planning and Analysis Office.

Michael Leonard of Clemson reports that three employer group sessions were held on Clemson campus in order to improve a process of employer feedback. A meeting was hosted by IBM where representatives of three corporations worked with SUCCEED representatives to identify good ways to involve companies in academic program assessment and improvement. From the corporate input, Leonard developed a protocol for campus focus group/guided discussion sessions with corporate recruiters, and conducted tests of focus group/guided discussion protocol with Clemson University campus recruiters of CME, CpE, EE, and IE graduates.^{66,67,68}

Toward benchmarking outcome indicators and assessment processes, Leonard has prepared a database for storage of, and access to, outcome indicators and provided web access to this resource.^{69,70} Colleagues at NC A&T, U Florida, and perhaps other campuses, have used the outcome indicator information. The outcome indicator database has been expanded to store information about indicators used by engineering programs on a selection of alternative campuses. Access to the database has been improved to respond to queries by discipline, outcome, and outcome indicator.⁷¹

Leonard has also modified SUCCEED's Curriculum Innovation and Renewal process to use outcomes assessment data as a refinement to strategic planning SWOT analysis, and

is revising Clemson's Industrial Engineering curriculum using outcomes assessment data as an input to the decision-making process.^{72,73}

Kamal Tawfiq of FAMU-FSU College of Engineering has planned a college-wide workshop on the use of student learning portfolio for May 2000. The workshop on will show departments how to collect, store and summarize the work of students as they engage in learning tasks specified in the curricula. Tawfiq is also pilot testing a procedure for assessing alumni performance. A college-level system has been established to acquire information/data on alumni performance in industry and graduate schools. Deadlines have been set for Departments to submit questionnaires to the college-level system, and the pilot run is currently underway.⁷⁴ Departments have developed the first draft of their objectives and how to measure them.⁷⁵

F. Student Transitions

The University of Florida's Integrated Product and Process Design program⁷⁶ is still going strong, with only a small amount of SUCCEED funds. The 24 program sponsors⁷⁷ pay support of \$15,000 per project to engage 137 students from 9 disciplines in 27 multidisciplinary capstone design projects.⁷⁸ Each design project is aided by a liaison from the company and one of 21 faculty coaches.⁷⁹

SUCCEED helps sponsor work at the University of North Carolina at Charlotte that seeks to apply the Supplemental Instruction model, successful in other disciplines, to engineering. Kathleen Nunnally's practicum in this area was not only approved by the Director of the Kellogg Institute and its Review Committee, but was also awarded "exemplary status." The resulting practicum report will be used nationally as a model for other educators. The UNC Charlotte/SUCCEED Supplemental Instruction program has served high-attrition "gateway" engineering courses with proven success since its implementation in 1996. An important feature of the SI experience for students is the built-in availability of the SI Leader who serves as leader, mentor, and model student to SI attendees. While Nunnally's use of Supplemental Instruction in engineering courses is innovative, she is now pursuing the special challenge of providing Supplemental Instruction for a Fall 2000 distance learning course. For all Fall 1998 courses, there was an improvement in the average final grade, as shown in Figure 1, and for all courses the Drop/Fail/Withdrawal rate was the same or lower for SI students as shown in Figure 2.⁸⁰

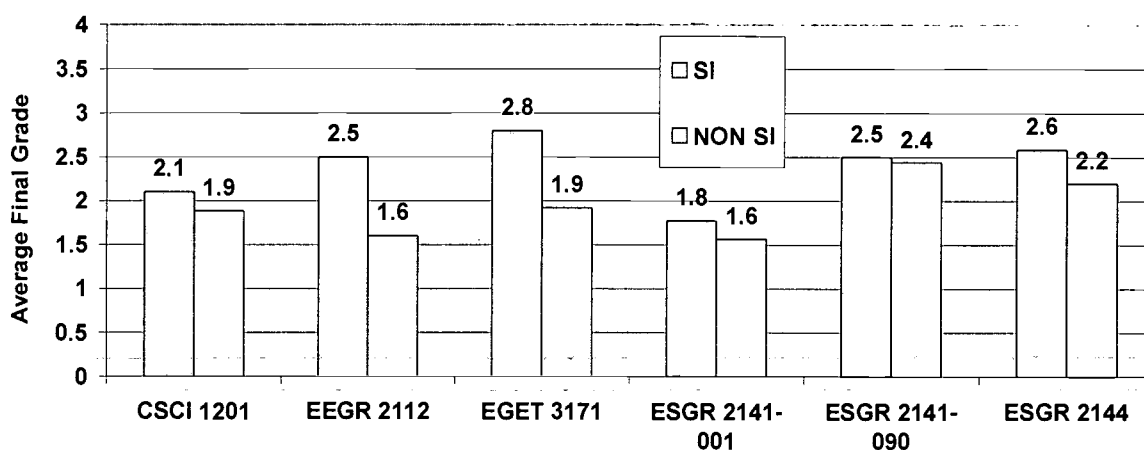


Figure 1. Average final course grade for regular SI attendees (5 or more sessions) vs. students attending 0-4 SI sessions (control group) for six courses in Fall 1998.

Nunnally points out that the leverage of NSF funds was critical to securing a permanent funding increase of \$15,000 (state dollars) starting next academic year, which represents about a 62% increase to the Tutoring Services / Supplemental Instruction budget. This permanent increase indicates an institutional commitment to programming targeting student success and retention.

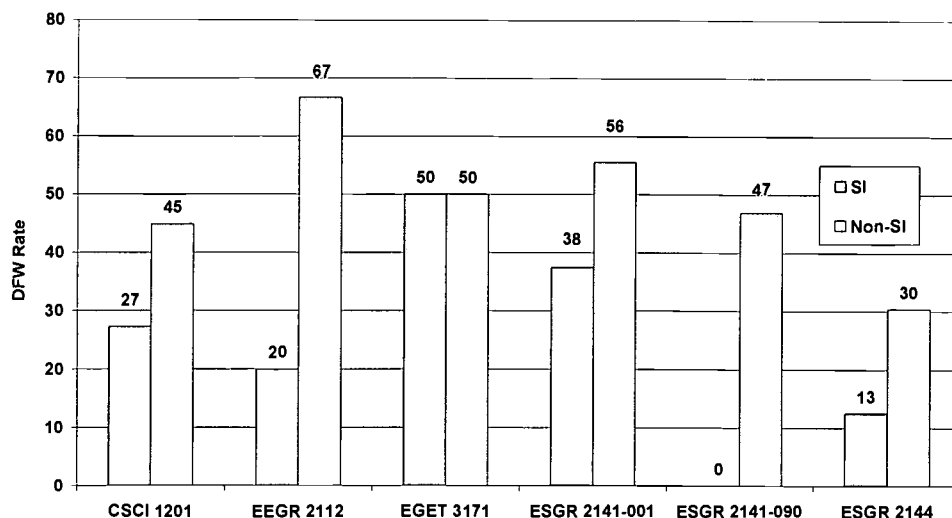


Figure 2. Drop/Fail/Withdrawal rates of students in Fall 1998 SI courses; SI regular participants (5 or more SI sessions) vs. non-SI students (0-4 SI sessions).

At Clemson, Marvin Dixon's work with multi-university student teams addressing interdisciplinary projects was expanded in the past year. The program began with 8 Mechanical Engineering and 8 Chemical Engineering students working with two faculty members on one capstone design project sponsored by the Sealed Air Division of Cryovac. The program was expanded to include students and faculty from Mechanical, Chemical, Industrial, and Materials Engineering and six additional industrial clients: Ryobi, Torrington, Michelin, GE, Carolina Filter, and Alcoa Fujikura, Ltd. In the 1999-2000 academic year, 200 students and eight different faculty participated. The project was recognized by ASME's 1997 Curriculum Innovation Award.⁸¹ The program has been disseminated extensively.^{82,83,84,85,86,87,88,89,90,91,92,93} Student teams are supervised by a jury where there is one faculty member on the jury for each discipline represented on the student design team. Typically there are four students on each team and four or five teams per project. This semester the six different projects are being addressed by a total of 118 students. Two of the current projects are not sponsored by industry—the design of an HVAC system for the university library and the design and construction of the mini-baja car.

In mentoring, UNC Charlotte revised the web site⁹⁴ for the Maximizing Academic and Professional Success (MAPS) program^{95,96} and are making upgrades to the MAPS database so that demographics, attendance, and retention of participants may be more easily tracked and can be linked to the COE retention database. Comprehensive web sites were developed for UNC Charlotte's introductory engineering courses, ENGR 1201/1202, as well.^{97,98} Cost estimating and ethics lectures were incorporated into ENGR 1201 by inviting local business professionals who are experts in the topics and alumni / local professional and senior / graduate student panel discussions were added. Electronic submission, grading, and return of assignments was initiated (for a course enrollment > 600 students) to improve efficiency and as a precursor to electronic portfolios.

Since 40% of the school's students are transfers, articulation is an important issue at UNC Charlotte. The College's transfer articulation worksheet⁹⁹ was recommended for use at the state level by the State Subcommittee on Transfer Articulation that met in Raleigh in February 2000. To assist in a successful transition to the workplace or graduate school, practice exams for both the GRE and FE are now available on the College of Engineering MOSAIC/NT computing system.

Patricia Tolley also reported that UNC Charlotte hopes to expand experiential learning opportunities, supported by the hiring of a new Faculty Associate for Experiential Learning in December 1999. Until December, the primary emphasis for experiential learning has been the promotion of cooperative education and 49erships during the freshman and sophomore years. A formal and comprehensive experiential learning plan is still to be developed, but already planned is a new multidisciplinary international design project involving junior and senior civil engineering and architecture students from UNC Charlotte and a university in Spain will begin in Summer 2000. The addition of new international opportunities to existing ones¹⁰⁰ is part of a strategy to enhance the global context for learning.¹⁰¹

A new multidisciplinary capstone design project at North Carolina A&T in spring 2000 formed a team of mechanical and electrical engineering students are designing, building and testing a system that will unwind a material from one spool to another with the material under a constant safe tension. Under the supervision of Samuel Owusu-Ofori, team members practice communication via electronic media in the course of the project. Especially interesting is that a first team of students designs an electromechanical device, and a second team takes input from the first team and develops a mostly electronic device.¹⁰²

In Virginia Tech's first year engineering/math/physical science calculus course, about 40% of enrolled students (who are considered at risk) are required take a one-credit class supplementing the regular three-credit lecture class. The Emerging Scholars Program for Calculus project directed by G.V. Loganathan features tutorials involving a significant number drill problems with on-demand help for students working in peer groups and a set of well-conceived hands-on experiments. These experiments are now being put in an interactive software form for the students to perform the experiments numerous times with different material properties and configurations.^{103,104,105}

Ben Sill reports that Clemson's ENGR101-120 courses are being reviewed and revised, incorporating appropriate elements from experiments at Clemson and other SUCCEED schools.¹⁰⁶ Material from Engineering Concepts (a course piloted at Clemson for freshman women) has already been incorporated into ENGR 120 Engineering Problem Solving and Design (required of all freshmen engineering students). With the acquisition of new classroom space (upwards of 20,000 square feet over the next two years), Clemson's General Engineering program will be able hands-on laboratories (similar to those used at Virginia Tech and the University of Maryland) as well as Collaborative Computer Classrooms. The College of Engineering and Science has designated \$50,000 for renovation of the new space.

In peer mentoring efforts, Clemson has developed and will offer in the Fall 2000 semester a learning community called FIRST CLASS (a FIRST year, Community for Learning And Student Success).¹⁰⁷ To promote a learning community, the program will have a special dormitory space and students will be scheduled in cohorts. The program received an Innovation Fund Grant from the University to help support modifications (computer lab in dorm, etc.). Program participants will have special sessions during Summer Orientation and, in addition to the usual Resident Assistant, each dormitory floor will be staffed with a peer mentor. Faculty will keep office hours in the computer lounge on the first floor to further assist the students. The program will admit 35 female and 35 male incoming freshmen engineering students.

Guo Quan Lu of Virginia Tech provides students multidisciplinary experience through electronic packaging team-oriented design projects.¹⁰⁸ These projects emphasize thermal, mechanical, electrical, and materials packaging aspects while reverse engineering actual market products. Each group includes students—one each from electrical, mechanical, and materials science engineering. The project provides hands-on experience for graduating seniors entering the electronic packaging industry by complementing an existing senior level academic electronic packaging course and hybrid packaging lab. The class challenges the students to make use of commercial software packages in addition to exploring an aspect of a product in attempts to provide better alternatives with respect to real industrial concerns such as price, reliability, size and weight. The current work includes the reverse engineering of two-way radios and a hand held GPS. The students have identified functional groups of the electronics and aspects of the packaging and product that they would like to investigate. Each group presents a weekly progress report to the class using an interactive style of learning in which students' questions and curiosity are encouraged.

The Virtual Corporations multidisciplinary design project^{109,110,111,112,113,114} at Virginia Tech has implemented a simpler grading policy¹¹⁵ and an internal assessment of the human resources within virtual corporation divisions.^{116,117} The organizational health assessment results are highly encouraging as to the contributions of the virtual corporation to the education of its employees. The business plans are being formulated and first drafts have been circulated for feedback from the entire virtual corporation divisional students (employees). It is expected that the business plans will be ready by August 15, 2000. The Personal Electric Rapid Transit Systems (PERTS) division^{118,119} has successfully demonstrated its transit concept with maglev operation. This is the first of its kind in the world with a unique technology. The Distributed Information System Corporation (DISC) division¹²⁰ has focused on a new medical monitor and is in the process of building its first prototype as well. Both the PERTS and DISC divisions have filed for disclosures with the university intellectual property office. This is a unique experience for students in both divisions. The SUCCEED funding for the virtual corporations project now constitutes less than 6% of the entire budget of the corporation.

The area of Micro-Electro-Mechanical Systems (MEMS) is highly multidisciplinary and covers engineering topics in microelectronics, semiconductor fabrication, mechanics,

thermodynamics, fluid mechanics, electromagnetics, and chemistry. A multidisciplinary design project in Application of Micro-Electro-Mechanical Systems directed by Toshikazu Nishida and Mark Sheplak was initiated in December 1999. Since that time, the MEMS Pro CAD tool suite from Tanner Research was purchased and installed in the computer laboratory classroom. The course, titled "Principles of MEMS Transducers," was taught in the spring 2000 semester to 13 registered students representing four departments (electrical and computer engineering, chemical engineering, aerospace engineering, and biomedical engineering). Two lectures were devoted to instruction on the MEMS Pro CAD tool. The students have been assigned to multidisciplinary design teams and are currently applying the MEMS Pro software to the layout of the MEMS designs.

In a continuing effort to expand opportunities that provide students real-world multidisciplinary design experiences, SUCCEED's Student Transitions team issued a request for proposals for multidisciplinary design mini-grants. SUCCEED funded eight new multidisciplinary design efforts to help achieve SUCCEED milestone of establishing MD on every campus. Results from the 1998 Multidisciplinary Design Conference held in conjunction with SUCCEED's Annual Conference have been shared,^{121,122} and another conference to further identify and disseminate MD best practices is scheduled for Fall 2000. Dave Ollis and Howard Phillips, team leaders, plan to implement the same strategy of identifying a variety practices and supporting the expansion of opportunities in the area of programs for freshman engineering students. A workshop to identify best practices in programs for freshman engineers is scheduled for May 11, 2000. A paper summarizing presentations and curricular models will be developed and published in SUCCEED's *Innovator* and presented at a national conference (ASEE/FIE) in 2001.

Dave Ollis, in collaboration with Steve Luyendyk of NC State's English department, worked to develop a strategy for incorporating more writing and speaking across the curriculum. The two summarized the teaching of freshman composition and analyzed why new engineering students are reluctant to see themselves as writers.¹²³ This effort is the continuation of a relationship between English and Engineering at NC State that has been nurtured by SUCCEED for a few years.¹²⁴

Transfer students are also a significant population at Virginia Tech; a comprehensive approach to providing a smooth transition to the university includes an articulation conference, an updated Articulation Agreement, community college visits, a mentoring program for first-enrolled transfer students, and a special orientation.¹²⁵ The articulation conference in 1999 was attended by 17 from community and other colleges and 7 from Virginia Tech; on April 21, 2000, 26 from community and other colleges and 9 from Virginia Tech are expected. Students and faculty at community colleges report, when surveyed, that results are positive and satisfaction is high.

Yousef Haik of the FAMU-FSU College of Engineering has worked on the development of the Multidisciplinary Design and Training Clinic within the college.¹²⁶ The clinic provides the infrastructure to integrate projects that have roots in industry to courses and capstone design projects, using integrated teams from different engineering disciplines.

An infrastructure and foundation space was provided by the College, including basic workspace for four teams to work simultaneously. At present, four student teams are working on industry-sponsored projects, and a staff member has been hired to maintain continuing contact with industry to enhance participation in this project. Industry partners so far have included Cargill, Cummins engine, and ASHRAE as well as entrepreneurial projects from starting local small business. It is anticipated that the Clinic will lead to the initiation of a product development center.

Tom Brown of NC State reports increased numbers of students coming from NC Community Colleges via a Comprehensive Articulation Agreement, a smoother transition to NC State as a result of smarter database of course equivalencies, and better assimilation of transfer students into student body due to informal orientation sessions mid-Semester. Visits to NC Community Colleges are ongoing to better advise students on what courses to take and the best times for making the transition. New initiatives are being considered to provide win-win-win relative to students completing a 2-year degree after transferring to NC State. NC State is looking to centralize all aspects of international study and transfers into a single tracking system, to take advantage of the common concern of course equivalencies. The expansion of distance education courses offered to NC Community Colleges will enhance Comprehensive Articulation Agreement as well.

At NC A&T, Eric Cheek reports that professional development workshops made four corporate site visits with group sizes from 12 to 24 students. Funds have been secured to conduct new visits for next year. The VISIONS Summer program will now be replaced by EMPACC (supported by a grant from ONR). The EMPACC program has a one-on-one faculty student mentoring program as well as a summer bridge. To promote multidisciplinary design, a \$10k gift from Caterpillar was secured for a Mechanical / Electrical Engineering joint project.

Jeffrey Connor seeks to encourage teamwork, foster creativity, and accommodate alternative learning styles in Virginia Tech's Engineering Fundamentals classes¹²⁷ by supplementing text and lecture with in-class reverse engineering and by providing devices as a basis of measurement. Pilot sections are expected to be tested in Fall 2000, with a full-scale implementation impacting 1,350 freshman engineers per year.

At Virginia Tech, Gene Haugh is using biological systems engineering as the focus of more "real-world" senior design projects and sophomore team design, construction, and testing experiences.¹²⁸ Design projects include those being completed for other states (California) as well as other countries (Senegal). Unfortunately, early design has impacted the opportunity for vertical integration; specifically, the increased design activities in the sophomore year have resulted in limited success in getting sophomore students to participate in senior design projects. The cooperation of faculty members in working with the seniors on their engineering design as well as the sophomores who cooperated on senior design projects has been noted, however.¹²⁹ This participation is expected to lead to more and better senior design projects while improving the design experiences for the students. The new activities developed for the sophomore Biological Systems Engineering (BSE) course are intended to increase the quality and quantity of

the design experiences in the BSE curriculum.¹³⁰

Dimitri Mavris at Georgia Tech is introducing multidisciplinary design through a design, build, fly student design competition.^{131,132} In this project, a fully functional remotely piloted aerial vehicle was built, the entire aircraft project was virtually designed using the Ideas solid modeling package, and extensive Nickel-Cadmium battery research was conducted to assure that the most efficient electric motor/battery pack combination was selected. The electric motor is in the process of wind tunnel testing to gain knowledge about propeller efficiency, thrust velocity effects, and rpm velocity effects. SUCCEED support allowed a graduate teaching assistant (Jason Zumstein) to allocate all of his time to guiding nearly 20 undergraduate students of various experience levels to the common goals of the project.

Tony Mitchell of NC State has worked to expand and enhance the College's Summer Transition Program and mentoring programs.^{133,134,135,136,137} Newsletters for minorities and women in engineering programs have been widely disseminated, and mentoring programs have been expanded to include all entering freshmen engineering minority students and all women in engineering. A record number of applications were received from engineering students who seek to become mentors and counselors in our summer bridge program. For this academic year, Mitchell could automatically assign mentors to each entering minority engineering freshman. In the past, only about 1/3 were assigned mentors. The additional assignments resulted from leveraging the SUCCEED funds to acquire a competitive grant for the Amoco Foundation of \$150,000. We are currently in the process of inviting each of the 226 accepted minority engineering freshmen to apply for and participate in our six-week 2000 Summer Transition Program. We expect 60 student to accept, at a cost to our minority engineering programs of approximately \$2,000 per participant. The Dean of Engineering has nominated the NC State programs for minorities and women for the 2000 Presidential Awards for Excellence in Science, Mathematics & Engineering Mentoring.

Under Gordon Moore's direction, Georgia Tech has sought to expand the CHALLENGE (summer bridge) program, adding another component addressing the communication issues associated with technical students. There was an increase in the marketing efforts surrounding Challenge in order to recruit more participants. This effort includes the coordination with the Enrollment Services group to assure proper timing and distribution of materials to incoming freshmen. There was also an increase in staffing for the program this past year. This enabled more time and energy to put into the planning and execution of the program. It also allowed for the increase of seminars, workshops and other programmatic entities of Challenge, including a freshman design competition that is gaining corporate support. The TRANSITIONS (transfer student bridge) program initiative has also been enhanced. This past year had the largest GT TRANSITIONS program to date, and participants continue to outperform those that do not participate.¹³⁸

In order to recruit more women to engineering fields and increase retention of women in engineering at Georgia Tech, Mimi Philobos held the first Engineering Career Conference (ECC), which 84 high school students attended, 33% of whom are high

school seniors who have applied to GA Tech College of Engineering.¹³⁹ A successful second year for the M&M Mentoring program had a significant impact on the retention of women students in the college of engineering. Changes to the M&M program are planned in order to increase the participation of members in various activities.¹⁴⁰

Scale-up and implementation of NC State's new Introduction to Engineering course continued, reports Mary Clare Robbins.¹⁴¹ The course addresses multiple ABET EC 2000 program outcomes: multidisciplinary teamwork; identification, formulation, and solution of problems; professional and ethical responsibility; effective communication; and knowledge of contemporary issues. A lab manual was created for students during spring 1999, and used for the first time in the fall 1999 semester. The course was offered to all 1102 freshman engineering students, and for the first time included an honors option for university scholars students. In response to course evaluations from the fall 1999 semester, the course will be offered in sections of not more than 46 students during the fall of 2000. Changes in syllabus, course delivery methodologies and content are currently being considered for the new format. Students in this course also participate in a study of freshman attitudes.¹⁴²

Sarah Rajala, Hatice Ozturk, and John Stone of NC State are working to put into place a new honors program for the College of Engineering, Electrical Engineering, and Computer Engineering. A new college-wide honors program is being initiated in conjunction with development of new university-wide honors program. 200 new students will be invited to participate for Fall 2000. An honors program has been established in the ECE Department for EE and CpE students, and new honors circuits courses have been offered. Lastly, a new honors symposium is being developed, "Materials through Civilization," to be offered Fall 2000. The honors program activities are being developed to enhance the success of gifted students. The new courses focus on inquiry-based learning, early connection to discipline, and early introduction to research. A new material science course will be offered to all freshmen in the honors program. Success of new honors circuits course has led to the development of an accelerated course that will be integrated into the new EE and CpE curricula. Assessment of new honors students will be initiated with new class in Fall 2000. John Stone, Professor of Civil Engineering has led the college-wide effort.

Mary Clare Robbins of NC State is also charged with providing strong guidance for students experiencing academic difficulty in first year. In Spring 2000, a program for at-risk students was restarted under the Coordinator of Advising for the Engineering Undesignated Program. Students whose first semester grade point average was below 2.0 were contacted by letter and/or phone prior to returning for the Spring semester. Each student's transcript and admissions records were reviewed. The students met individually with the Coordinator of Advising to determine possible causes for the academic difficulties. During this meeting students were advised about various opportunities for academic support available both in the College of Engineering and through the University, including the College of Engineering Tutorial Program, the College of Engineering Writing Assistance Program, and departmental tutorial programs. Students could also attend a Saturday workshop on study skills, time management skills, and other

academic success strategies. Students are also advised as to changes that might have been indicated for their current class schedule. The progress of these students will be assessed. It is anticipated that a class will be designed and offered to students in academic difficulty in the Spring semester of 2001.

NC State seeks to provide more upper division multidisciplinary design opportunities, so an entire session of the COE-Teach faculty development program was devoted to multidisciplinary teaming/design. The Entrepreneur's program continues and is institutionalized. Numerous presentations on Entrepreneur's program have been made, including: Mississippi State, UNC Board of Governors, businesses, and high schools.

John Gowdy of Clemson is working to teach a course involving shared expertise across multiple SUCCEED institutions—developing computer modules to reinforce material in a course of speech signal processing. He reports that one of the speech processing modules has been completed, and three other ones are nearing completion. The modules and the accompanying videotape will be made available to at least one other SUCCEED institution for use in the Fall 2000 semester.

Robert Hendricks of Virginia Tech reports that the multimedia presentation *The GaAs Semiconductor Manufacturing Process* has undergone significant modifications to improve its pedagogical value as an educational tool. In particular, it now incorporates

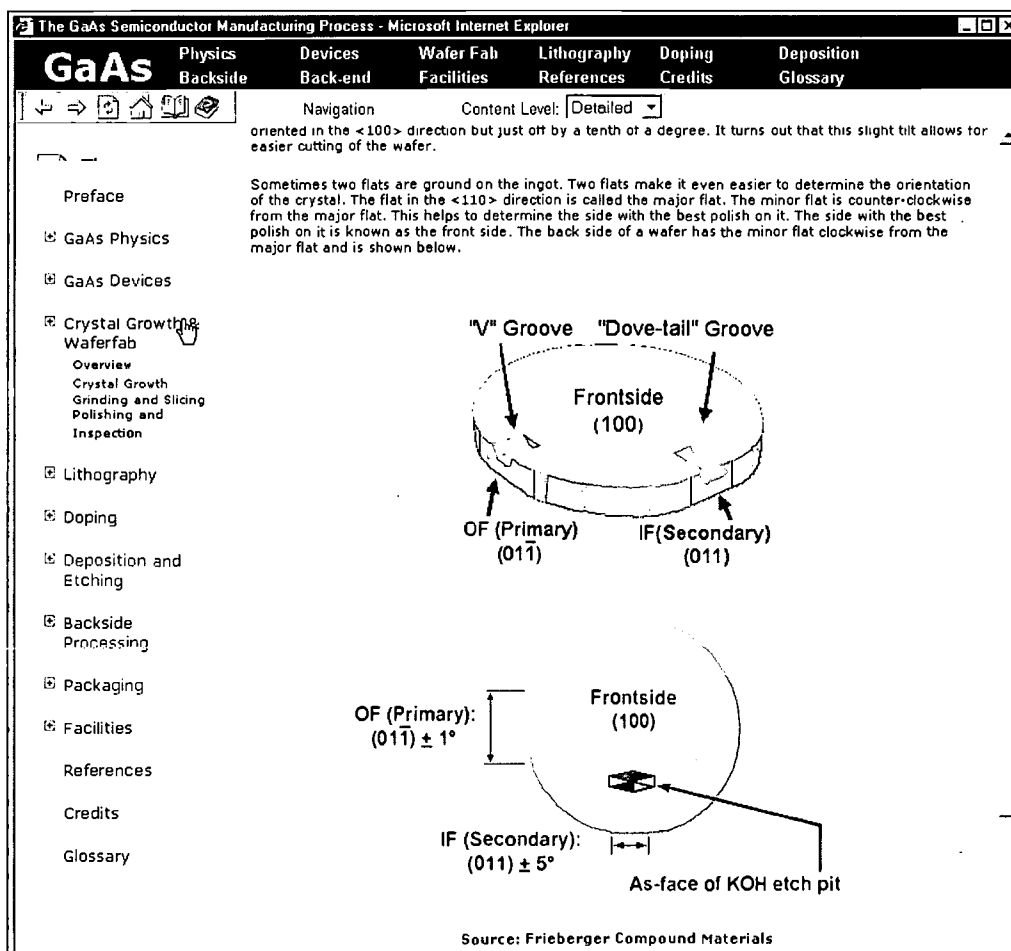
- a model by which the user may select the academic level of the presentation,
- interactive quantitative models by which the user can visualize complex computational results in a simple and efficient manner,
- video clips of all important steps in the manufacturing process, and
- quizzes (with answers) for every section.

During the past academic year, with the aid of ten students, Hendricks has

- made significant improvements to the navigation of the CD,
- added three new interactive Java applets that allow the student to do quantitative “what-if” calculations on the distribution of impurities in GaAs single crystals grown by the CZ process, the diffusion of dopants in GaAs, and the doping distribution of ion-implanted wafers,
- added over 60 new images and videos,
- increased the coverage and emphasis on environmental and safety issues associated with GaAs fabrication,
- re-written most of the text to make it more appropriate for on-screen reading / viewing,
- significantly improved the method of viewing the glossary and references, and
- added quizzes at the end of every section (including an answer sheet that can be referenced after answering the questions).

Version 4 of the CD is available from the NEEDS database; Version 6 of the CD will be released in Summer 2000, and is designed for students at various levels from sophomores with only an introductory chemistry background to seniors in electrical engineering. It is aimed at both visual and analytical learners as a supplement to more traditional lecture-format courses. Students may use the CD in conjunction with textbooks on

microelectronic materials processing to gain both an analytical and visual appreciation of the complexity and sophistication of the processing of modern semiconductor chips. The CD is designed for distribution to the students for use at home on their personal computers. A partial screen shot of the program is below.



A publication is in preparation for J. Eng. Education in which both the processes of developing the CD and the quantitative assessment will be presented.

Laura Bottomley at NC State reports that as a result of the unexpected loss of our Assistant Dean (Ric Porter) and the resulting redistribution of responsibility, the mentoring program was run at the same level as the previous year. Bottomley does point out that an infrastructure was put into place to allow for scale-up in the 2000/2001 school year, which includes a web-based manual, calendar and registration form. Bottomley also reports that faculty at NC State integrated several real engineering problems into the freshman engineering course, including: design a hog waste retention facility, design a facility for creating a television commercial for a car, study a set of famous engineering failures and second guess the engineers involved, etc.^{143,144} Freshman design projects were required of every freshman. An additional effort involved taking COE students on outreach efforts to local schools. The college students were called upon to tutor, mentor, and teach K-12 students.¹⁴⁵ This had the effect of enhancing engineering identity and a sense of community in the college students.¹⁴⁶

In addition to the ongoing mentoring program and efforts to include gender and ethnic diversity issues in the curriculum of the freshman engineering class at NC State, links are being forged to work in cooperation with all other Colleges to enhance the overall climate for women students, staff and faculty.¹⁴⁷ Connections have been made with several separate groups including the Council for the Status of Women, the Coalition for Women in Science and Engineering and others. We are participating in an additional climate survey conducted in cooperation with several other universities called the Women in Engineering College Experiences (WECE) project. This is a three-year project, and the results of the first year will be available soon. Having identified the first year C programming course as a problem area for female students, we offered a preparatory seminar in the fall 1999 semester designed to “level the playing field” for all students and to serve as a confidence booster. The students who participated in that seminar are taking C++ this semester, so results are not yet available.

G. Technology-Based Curriculum Delivery

Bill Moss of Clemson conducts workshops to train faculty in the use of educational technology. The number of WebCT (Web Course Tools) courses and student accounts has grown from 50 and 3000 in the fall of 1998 to 200 and 12,000 in the spring of 2000. In the past year, 18 workshops have been held for faculty and graduate teaching assistants: 4 in May, 1 in July, 2 in August, 3 in September, 4 in December, 2 in January, and 2 in February. Student surveys have shown that WebCT is well received by students who cite the grade-reporting feature as a favorite. Instructors are using a wide range of tools, especially the quiz tool. Clemson makes heavy use of training material from other universities and have created some as well.^{148,149,150} In the introductory WebCT workshop, Moss starts with three tools: A gradebook, bulletin board, and course syllabus, all of which are asynchronous. Technologically challenged faculty may stick with these tools for a semester before trying other tools. Instructors learn how to incorporate ALN tools in their course through targeted workshops. WebCT is being studied to determine how a course management system could be used to support the active learning model of instruction that Clemson's College of Engineering and Science wanted to introduce with its Pilot Laptop Program and ultimately throughout the college. After four semesters, a number of faculty are firmly committed to using this type of resource in their teaching. John Minor of Clemson reports that, except for power outages, the servers supporting WebCT for the College of Engineering and Science have been up 100% of the time. The Clemson WebCT Portal¹⁵¹ and Administrative¹⁵² sites can be viewed externally.

Laurie Sherrod reports that students in the Pilot Laptop Computer Program at Clemson are developing advanced technical skills from the experience of carrying and caring for the laptop computer as a vital tool in their college education.¹⁵³ They are also benefiting from collaborative exercises used in their laptop classes and developing a sense of community with other laptop students—enabling them to learn skills found valuable by potential employers.^{154,155} Pilot laptop program course faculty are learning new ways to use technology in their classes and are also able to use these valuable new skills in their other classes. The Pilot Laptop Program faculty meet at least once a month to exchange ideas, and WebCT course site is maintained for laptop faculty and other WebCT users to exchange ideas. Laurie Sherrod and Bill Moss meet twice a month with the STARS (Student Technology AdvisoRS) to exchange ideas and for training. A WebCT course site is also maintained for laptop students to exchange ideas. An assessment of the program initiated in Fall 1998 has just been completed¹⁵⁶ and was overwhelmingly positive. The College of Engineering and Science expects to propose that entering CES freshmen be required to own a laptop beginning with the class of 2001.^{157,158,159,160,161,162,163,164,165}

Virginia Tech's efforts in technology-based curriculum delivery (TBCD) are coupled to efforts in faculty development—including developing a partnership with the University's Faculty Development Institute (FDI), which assists faculty to improve teaching and learning through the use of technology. The FDI presents a three-day workshop in the summer and twenty discipline-specific workshops on advanced topics during the academic year; status of individual TBCD projects is described in PI progress reports.

At Clemson, web-based modules imported from the University of Michigan are to be used in the Chemical Engineering laboratory. Modules showing important pieces of chemical engineering equipment and devices were imported for use in conjunction with the Chemical Engineering department's undergraduate unit operations laboratory.¹⁶⁶

Charles Price of UNC Charlotte has been working on the development of a distance learning classroom, and reports that a significant upgrade is in progress, according to feedback from instructors and students. Deployment of electronic Supplemental Instruction workstations for office hours with remote students is also underway, and planning for a faculty multimedia capture facility is complete.¹⁶⁷

Will Saunders, Charles Reinholtz, and Donald Grove have used vertical integration to enhance mechatronics education at Virginia Tech. They have established vertical integration of mechatronics design concepts down to the sophomore level in the Department of Mechanical Engineering using a design class (ME 2024) as the framework. Design, fabrication, and incorporation of the VT84 Project Box, a custom 'black-box' prototyping system was used to introduce ME 2024 students to microcontroller operation and smart-product prototyping, and design and incorporation of a custom interface facilitated operation of the VT84 by students with no background in microcontroller programming or operation. All components were available to a pilot group of students during the Fall 1999 semester. Assessments of student perceptions involved in the project indicated that the vertical integration project was very motivational to second-year students; publication of these results is forthcoming.¹⁶⁸

At the University of Florida, Haniph Latchman has promoted the widespread use of www tools in teaching by developing the Lectures-on-Demand in ALN Method, which has been piloted and in the process of being evaluated.^{169,170} He has established 8 undergraduate courses in Electrical/Computer and Chemical Engineering using WebCT and streaming audio and video.

Braketta Ritzenthaler reports that the FAMU-FSU College of Engineering hosted a coalition-wide workshop, Lectures on Demand Using Synchronized Streaming Media on May 28, 1999. Approximately 20 SUCCEED coalition participants engaged in activities designed to provide a basic understanding of the technical and pedagogical concepts involved in creating and distributing synchronized streaming media lectures, gaining hands-on experience in capturing, editing, and converting audio and video. Lectures from courses delivered using on-line using streamed audio and video are archived for students who missed the class and for students who need a review of the course materials and lecture.¹⁷¹ Integrating TBCD activities into faculty development, Ritzenthaler developed and disseminated the *E-Prof* newsletter¹⁷² as a medium to communicate to faculty, staff and others the success stories of work on our campus on faculty development and instructional technology. Issue 1 has already been distributed, and articles for Issue 2 of E-Prof are being collected. The newsletter has been well received by faculty and staff in engineering, other interested parties at Florida A&M and Florida State Universities and engineering professionals throughout the SUCCEED coalition.

On July 16, 1999, about 30 FAMU-FSU College of Engineering faculty members participated in a day-long workshop that concentrated on improving cooperative learning strategies and integrating instructional technology in engineering classes. This faculty development workshop will become an institutionalized yearly event with four primary topics: improving an instructional strategy, information on promotion and tenure, integrating instructional technology and a College technology update. Faculty were introduced to Course Info as a courseware authoring tool, and approximately 40 percent of faculty are currently using Course Info for their classes. Evaluations of the workshop indicated, on a 5-point scale (of the increasing frequency, likelihood, and quality, of the items shown below, respectively), a significant improvement in the likelihood that cooperative learning will be used and a high quality rating.

| | |
|--|-----|
| How often have you used formal cooperative learning in the past? | 2.5 |
| How likely is it that you will use formal cooperative learning in at least one of your classes in the next year? | 3.8 |
| Overall, how would you rate the quality of the workshop? | 4.2 |

Jim McClellan of Georgia Tech reports the development of a streaming media creation tool that simplifies the rapid development of high-quality computer-based presentations, and requires only a laptop and camera.¹⁷³ The rapid development with minimal time investment is attracting and enabling more faculty involvement, and Georgia Tech is presently supporting one on-line course developed through this mode, and many more are in the production and planning stages. A beta version of the tool is being released for use outside of Georgia Tech.¹⁷⁴ This work is part of a larger development effort—SUCCEED is supporting a crucial part of the development as we try to make this tool easier to use and more stable for a variety of platforms and external users.

Tutorial modules for MATLAB training have also been developed at Georgia Tech, and are available to students via Web-CT that links to a Real-Media streaming server. Creation via screen capture is not difficult, but will be improved with the use of our new streaming-media lecture creation tool. A screen-movie capture system called Hyper-Cam has been used to narrate the actions of a teacher using the MATLAB software. Using this process over 50 short movies (1–2 minutes) have been created. In addition, a small database has been created to guide users into the set that may be applicable. These modules are now routinely used in Georgia Tech's introductory Signal Processing course that has a computer-based laboratory using MATLAB. For a subset of students the modules have been helpful, but easy access to streaming material over different network conditions has limited widespread use of this medium.

Georgia Tech has adopted Web-CT as its standard course-management software. Web-CT has been used for all aspects of managing several very large undergraduate courses (200–400 students per semester) in Electrical and Computer Engineering, pushing the limits of Web-CT to know what it does well versus some of its significant limits. All assignments are available from Web-CT, and most interaction is done via Web-CT's bulletin board. We now have 1.5 years of experience doing this and have been doing a consistent survey of student reactions. Some highlights include:

- Students like the 24/7 availability of the material and they love the continuous access to their grades.
- Students find the bulletin board a bit clumsy as compared to newsgroups
- Professors find the quiz creation of on-line questions to be tedious; and some aspects of the grade book are hard to maintain.

As a result of piloting Web-CT in the environment of such a large course, many TA's are now trained on using this environment.

Scott Midkiff at Virginia Tech reports that multiple undergraduate engineering courses are now using course management systems, primarily CourseInfo. The pilot project has provided an infusion of ideas and technology expertise to enable the development of fully asynchronous online courses. For example, seven such engineering courses are presently under development by six faculty with other funds. Some information on technologies and best practices for course management and online course delivery identified in this project is available.^{175,176} Workshops in distance learning, asynchronous learning, and course management systems are under development and will be delivered during the period April 2000 to June 2000. The first workshop, in asynchronous learning ("Designing A Course for On-line Delivery: A Case Study" to be taught by Steve Edwards of Computer Science) will be delivered on campus in April 2000.¹⁷⁷

NC State, under the direction of Tom Miller, is enhancing the ability of faculty to incorporate use of WWW-based course materials in curricula. The Wolfware project was launched from College of Engineering with partial support from SUCCEED, and more than 60 courses with more than 5,000 unique students were included in Spring 2000 Wolfware beta test.¹⁷⁸ WebCT was adopted for integration with Wolfware in the upcoming academic year. Wolfware uses an open, modular design that provides an interface between the front-end tools used by faculty and students and the back-end infrastructure, including the AFS file system, standard NCSU ID and password databases, R&R database, library resources, etc. It has dramatically reduced the barrier to entry for our mainstream faculty while preserving the power and modularity required by our innovators and early adopters. A one-day workshop on teaching with technology for NCSU Engineering faculty will be held April 29, 2000. A two-hour session on Wolfware will be included in that workshop.

NC State has doubled the number of course offerings using Mbone and H.323 internet-base interactive conferencing technology over the past year, UNC Charlotte has begun using Mbone to deliver engineering courses to 2+2 sites, and NCA&T will begin delivering courses in the upcoming academic year.^{179,180} A pilot project to share nuclear engineering courses with the University of Tennessee at Knoxville was undertaken Fall 99; plans to continue and expand this project are under development. NC State pioneered the use of Mbone technology for live, interactive distance education and made it simple by developing DETA, the Distance Education Teaching Assistant. Although originally a Unix tool, DETA has been ported to Windows 95, 98, and NT, and also to Linux. Using Linux, a complete DETA workstation is under \$2,000. Our initial success led to the establishment of a state-wide collaboration involving SUCCEED institutions NCSU, UNCC, and NCAT. We are currently using DETA and commercial H.323 systems to

deliver undergraduate engineering courses to undergraduate students in Asheville, Wilmington and Kinston, NC.

Siegfried Holzer was videotaped using technology in his class and describing his teaching techniques and philosophy during an interview. Joe Tront of TBCD has taken the lead on this activity by videotaping Siegfried Holzer, an active SUCCEED PI and CIT leader, using technology effectively in his class. Three CD-ROMs of material were recorded and are now being edited to a useable form. Once completed, the CD-ROM on effective teaching with technology will be useful in events for new and experienced faculty and graduate students. It will also be a product that can be disseminated as a CD or on the SUCCEED web site.

Results from TBCD's survey of technology proficiency and use among faculty have helped direct efforts in that area. A variety of interesting conclusions have been presented.^{181,182} More interesting information is anticipated when the survey is repeated in the coming year.

H. Dissemination

SUCCEED has had success in a wide variety of approaches to dissemination, including traditional and more active modes of dissemination.

“I cannot put a price on the impact of your visit had on our faculty and will have on our students...”

– Mississippi State Engineering Dean

A. Wayne Bennett

[after a workshop visit by Siegfried Holzer]

Council of Schools

The Council of Schools partnership has flourished in some cases, where there was a good correspondence between the interests of a school and the expertise of SUCCEED. The University of Central Florida has been an active participant in a variety of SUCCEED workshops—over 25 UCF faculty have participated in SUCCEED faculty development activities. Tim Anderson made a visit to the University of Arkansas by request, and engaged in discussions with faculty and administrators about possible areas of sharing. The University of Arkansas is being considered for membership in the Council of Schools. A follow up visit to all the COS partners who have shown an active interest and participation is planned for this and next year, to get an assessment plan in place.

Siegfried Holzer visited Mississippi State University to give a workshop to 24 faculty on *Active Learning in the Classroom: With and Without Computer Assistance*,^{183,184} including the Dean of the College of Engineering. Afterwards he had informal meetings with faculty members. The minute paper responses from workshop participants are available¹⁸⁵ as are Holzer’s responses to questions raised in the minute papers.¹⁸⁶ The workshop had such an impact that Holzer was awarded an unexpected honorarium for his efforts. Robert Green, Undergraduate Coordinator in the Dean’s Office at Mississippi State University, reports that Tom Miller of NC State also visited and was well received.¹⁸⁷ Holzer’s responses to minute papers has also drawn an invitation to present his workshop at the Arkansas ExCEED Workshop.¹⁸⁸ Mississippi State conducted jointly with SUCCEED the Faculty Development Survey in Summer 1999. Mississippi State also plans to schedule an Effective Teaching workshop by Richard Felder and Rebecca Brent.

Conferences

SUCCEED had an excellent booth location at Educause’99—a corner booth in a prominent position. The conference’s 3966 attendees provided continuous traffic flow and everything SUCCEED brought to the conference was taken by visitors to the booth—532 CD-ROMs and a 35 copies of The Innovator newsletter. Additional CDs were sent out as a follow up from addresses left at the conference after the supply had run out. I have a large post attendees list if anyone wants that for follow up. Many came to the booth specifically looking for Volume 2 of SUCCEED’s Greatest Bits CD-ROM, having found Volume 1 useful. A large number of the participants had heard of the work SUCCEED was doing and stopped by for a short visit.

At Frontiers In Education ’99, the booth showcased the Frith Hands-On Freshman Engineering Lab featured in the Spring 1999 Innovator. This brought a lot of people into

the booth to take a closer look at the pieces of the disposable camera and see our autonomous lego car. We exhibited at FIE '99 from November 11-13, 1999, and handed out over 200 CDs (about 40% of the attendees). Again people visited that said they had gotten Volume 1 and were anxious to see what Volume 2 had on it. Among those interested in obtaining copies of SUCCEED's Greatest Bits CD-ROMs have been representatives of publishers and engineering companies.

SUCCEED has also sought to bring lessons from engineering education in other parts of the world to the United States through participation in the International Conference in Engineering Education. ICEE 1999 was held in the Czech Republic, where a number of SUCCEED faculty presented their work. An international audience of 21 attended a workshop on Synchronized Streaming Media following the conference. Participation in ICEE 1998 in Rio de Janeiro, Brazil, led a group of Brazilian schools to invite Richard Felder and Rebecca Brent to return to give an Effective Teaching workshop to a multi-institutional audience. A number of the attendees were contacts made at the 1998 conference. Other follow-up from ICEE conferences include the sharing of copies of SUCCEED's newsletter, CD-ROMs, and special publications.

Dissemination Using a Variety of Media

NC State's Engineering Entrepreneurs program was featured on National Public Radio's Morning Edition on February 23, 2000.¹⁸⁹ NPR's lead in on their web site recounts, "[High-Tech Education](#)"; Mary Hartnett of member station WUNC reports on how students at NC State University in Raleigh are learning how to turn their high-tech and Internet ideas into valuable products and services. Tom Miller, a computer engineering professor at NC State, started his engineering entrepreneurs program in 1993. His graduates have been channeling their know-how into start-up companies, and in several cases earning millions." The web site also provides a link to a recording of the 3-minute, 13-second broadcast.

Two issues of the *The Innovator*, SUCCEED's newsletter, were published with a distribution of approximately 4000 per issue, including distribution internally, to all U.S. engineering deans, at conferences, and to our Council of Schools partners.

After the success of Volume I, a CD-ROM of "SUCCEED's Greatest Bits Volume II" was created, containing information on 12 projects useful to engineering educators. Over 2000 of the Volume II CD-ROMs were distributed at conferences and school visits. Development on Volume III has been initiated, expanding the pool of contributors to include educational innovation from SUCCEED's Council of Schools members. The contributions to Volume III of the CD-ROM include:

- Chiang Shih produced a web-based teaching package to supplement the teaching of the Thermal and Fluids related courses. In the process, he developed a virtual laboratory environment to integrate the laboratory experience with the regular classroom teaching of the Thermal and Fluids related courses and provided comprehensive web-linked references with an emphasis on the introduction of state-

of-the-art technology and practical applications. Taking advantage of many visualization-enhanced presentations on the web, the package is designed to stimulate students' interests and, at the same time, enhance their understanding of fundamental thermal principles.

- Donna Reese of Mississippi State is developing an animation applet for teaching introductory programming concepts. The animation applet has been extended to include visualization of object-oriented programs and activation records for recursion. Assessment indicates that students who take advantage of the online activities provided do significantly better in their programming courses.^{190,191,192,193}
- James Craddock of Southern Illinois University is creating a Civil Engineering Laboratory Web Site for Strength of Materials and Introduction to Environmental Engineering courses.^{194,195} The web site for CE labs has been created Mechanics of Materials and Introduction to Environmental Engineering.¹⁹⁶ Lab web page material for Torsion¹⁹⁷ and Tension Experiments is ready and material for Suspended Solids and BOD (Biochemical Oxygen Demand) pages is under construction.¹⁹⁸

Project Transfer

The use of the Multimedia Learning Environment (MLE) for Statics^{199,200,201} developed by Siegfried Holzer continues to spread. Sam Tongtoe, an Assistant Professor at the Citadel, wrote, "I just wanted to let you know that I use the program to supplement the lecture to help my students understand Free Body Diagrams, equilibrium, etc. My students really like the program. I will try to get the evaluation from them. The program is a valuable tool for my class." The program is available for free download,²⁰² and Holzer and Andruet are planning to test an Internet version of the Multimedia Learning Environment on campus in the coming year.

I. Assessment

Performance metric data collected from CITs and CFTs for years six and seven indicate that the coalition is making appropriate progress on the achievement of its milestones.

A qualitative assessment and evaluation of the Council of Schools dissemination effort and results of the past two years is being conducted using an abbreviated case study method. The face to face interviews normally conducted by visiting campus sites will be carried out primarily by phone and email contact. Both SUCCEED and Council of School participants in the visits and subsequent interactions from selected Council of School members will be included in the interview pool. The purpose of this study is to determine factors and behaviors that both lead to and detract from success in this method of dissemination of SUCCEED results. Lessons learned will be implemented in a proposed expansion of this method over the next two years.

The final A&E summary report for SUCCEED will be an archival compilation, assessment and synthesis of the results of this total ten year EEC project. The plan is to begin gathering both process and outcomes information starting in year nine and begin preparation of the final report in the last half year of the formal funding period. The assessment methods employed will include bibliometric analyses, case studies, benchmarking and metrics collection. All team leaders, project PIs, identified educational innovation experts within the Coalition, selected institutional administrators and non-coalition participants will be involved in contributing to this major summary effort. This activity will represent the primary effort of the A&E Team in the last two years of the Coalition's formal operation and a change in direction from formative to summative evaluation.²⁰³

Year six metric data from the CITs and CFTs has been evaluated and reported. The year seven metric data is now being compiled and evaluated. Results of the Outcomes Assessment metrics for both years has been complete and shows that good progress is being made towards achieving the milestone for that goal. There is little question that the quantitative milestone will be reached before the end of the formal funding period for SUCCEED.

The longitudinal study of enrollments and degrees awarded by SUCCEED compared to the remainder of the engineering colleges in the country was begun in 1996 and has been reported on a two year cycle. Data from the Engineering Manpower Commission Reports of the American Association of Engineering Societies dating back to 1989 are the basis of this study. A third report of this effort is scheduled for publication and distribution in June 2000.

A final report was prepared and distributed on the six Diffusion of Innovation case studies conducted to determine factors effecting successful dissemination of educational innovations. The results provided a set of guidelines that promote successful diffusion of educational products. In addition to confirming the Rogers' criteria for successful product diffusion it was determined that two other factors that promoted success for

educational products was a faculty champion and an appropriate marketing partner.^{204,205} Two PI projects were identified and funded as mini-grants to test the implementation of the developed guidelines. These projects are the web Inventory of Scholarships for Native Americans and the integrated English and Engineering Experience in the first year engineering program at NC State. Both of these are now undergoing case study evaluations and a report on their success will be forthcoming shortly.

Execution of studies of programs on various SUCCEED campuses has helped highlight the need to pursue data elements that were faulty, incomplete, or missing entirely from the SUCCEED Longitudinal Database.²⁰⁶ For example, the study of Minority Engineering Programs requires a baseline of SAT scores or high school grade point average in order to identify pre-intervention differences between participants and non-participants. It was discovered that SAT/GPA data were corrupt for some cohorts of the FAMU and FSU students.²⁰⁷ Negotiations with the Florida Board of Regents are complete and a data supplement is expected. Despite difficulties in getting current data from all institutions, continuous progress is being made in the study of various programs—studies of Engineering Entrepreneurs, Knowledge Studio, IMPEC, and other programs are in progress.

At UNC Charlotte, the development of learning communities has been a strong objective, so special efforts have been made to assess progress in that area. Students who leave the College are identified via the retention tracking system, which pinpoints which students (by social security number) do not return from one semester to the next. Students who change majors are required to complete a *Change of Major Survey*,²⁰⁸ the results of which are used to identify reasons for students leaving. The Office of Student Development and Success (OSDS), created as a result of feedback from student focus groups regarding the College's recent reorganization, reports retention / learning community results (including *Change of Major Survey* results) annually to the College Administrative Council. A similar system to track the retention of graduate students and where they go when they graduate has been developed and implemented. The extension of this tracking system to include graduate students helps view the educational process as a holistic system—it is expected that the undergraduate and graduate databases will be linked so that it is possible to track the success of students who go on to graduate school at UNC Charlotte. Questions assessing the development of student learning communities have also been added to the annual student²⁰⁹ and alumni²¹⁰ surveys. Also of note is that a freshman engineering learning outcomes database is used to directly map ABET EC 2000 outcomes to specific measures.²¹¹

SUCCEED continued to support evaluation by an external source through the Qualitative Assessment Team. The process used to close the assessment loop by providing feedback needed for improvement has been recorded in proceedings.²¹² The campus visits to compile information for the Qualitative Assessment Case Studies had just been completed in time to receive mention in SUCCEED's Year 7 Annual Report. Subsequent to the completion of the site visits, a summary report was issued.²¹³ This report described the methods and findings of the site visits made by members of the Qualitative Assessment team to the eight member institutions of the SUCCEED Coalition during the

sixth and seventh years of program implementation. These visits were conducted between January 1998 and April 1999. The primary purpose of these site visits was to determine how each Campus Implementation Team (CIT) is structured and organized, its progress, and how well the Coalition Focus Teams (CFT) are operating on each campus and across the coalition. Particular attention was paid to how well SUCCEED, through this structure, is achieving its overall goals in the areas of Faculty Development, Outcomes Assessment, Student Transitions, and Technology Based Curriculum Delivery and with respect to institutionalization of earlier innovations and dissemination of successful projects to other institutions. A secondary purpose of each visit was to provide feedback to each CIT for quality improvement purposes. The goals and plans outlined in the Cooperative Agreement of October 1997 and the Strategic Plan of April 1998 guided data collection activities.

Within the overall context of SUCCEED's evaluation and assessment activities, the intended role of qualitative assessment is to reflect the experiences of many of the key participants and others within the various colleges of engineering. In all, approximately 180 individuals were interviewed for the case studies including coalition leaders; the CIT leaders, deans, and CFT representatives on each campus; department chairs (both those who had been involved in SUCCEED and those who had not); other administrators; project principal investigators; and students. The Coalition Focus Team members represented Faculty Development, Outcomes Assessment, Student Transitions, and Technology-Based Curriculum Delivery.

Based on the findings of these campus case studies, we can conclude that SUCCEED is making creditable progress toward meeting its goals in a number of areas. In particular, a positive first year environment appears to have been created and institutionalized at most institutions with the introduction of a new freshman course sequence that incorporates introductions to the various disciplines with hands-on laboratory activities. Summer transitions programs for minority freshmen also appear to be successful at enhancing academic success and retaining participating students in engineering. Mentoring programs for women and minorities are similarly successful. Faculty development efforts appear to be well organized and a few campuses are successfully taking ownership of faculty development within their colleges of engineering. The Outcomes Assessment team has made substantial progress in providing useful workshops, instruction and guideline materials, and instruments to all of the campuses to assist them in their curriculum improvement processes in anticipation of accreditation visits to each campus from ABET.

We identified four keys to success for the campus implementation teams. Most important, SUCCEED as implemented should fit with the college's mission and goals. Second, the support of SUCCEED efforts by the dean of the College of Engineering is required. Third, whenever possible, SUCCEED leadership positions on campus should be filled by members of the permanent faculty and administration to prevent it from being perceived as a marginal program. Finally, it appears to be advantageous if the CIT leader resides in the dean's office since those leaders tend to have a college wide perspective and easy access to funding sources.

The major recommendations from this study, which are discussed in detail in the summary report, are as follows:

1. The focus of coalition activities going forward should be on students, faculty, and dissemination efforts.
2. Dissemination and adoption of successful SUCCEED innovations within the Coalition needs to be improved. It is suggested that this might well be addressed by the Focus Teams placing greater emphasis on this issue in their plans for the remaining years of the Coalition's formal operation.
3. Since many programs have been initiated, put in place, and institutionalized by the Campus Implementation Teams, the roles and future plans of the Outcomes Assessment and Technology Based Curriculum Delivery teams should be reviewed and modified as appropriate relative to what each has accomplished to date and their continuing need and ability to provide assistance and guidance coalition-wide.
4. The Student Transitions focus team should be restructured in recognition of the fact that some of those programs have been successfully institutionalized while others may still benefit from coalition-wide leadership. Those areas that might still warrant a coalition-level effort include: pre-college transitions for community college and other transfers, mentoring, engineering "gateway" courses, multidisciplinary design, and workplace preparation.
5. The Faculty Development team should continue its efforts to move the Effective Teaching Workshop to the campuses with local leadership. It may also expand its scope to include mentoring and success skills for faculty in research and service in addition to teaching. They should also reach out to department chairs to try to win their support for these activities.
6. The Campus Implementation Teams should carefully review their organization, personnel, and operations in light of the recognized four factors for CIT success highlighted above and revise their structure, leadership, membership, interaction with administration, and future plans to improve their potential for greater effectiveness and success.
7. Although several programs have been initiated and appear to be meeting with some success disseminating SUCCEED's results and products beyond the Coalition, it is not apparent that there exists a definitive and cohesive vision and plan for the accomplishment of this very important objective in the last three years of the Coalition's formal operation. Coalition leadership needs to develop an expanded vision and plan for dissemination and ensure strong leadership to coordinate and implement all of the necessary activities.
8. As SUCCEED enters the final three years of its award period, another important issue that needs to be addressed is the future of the Coalition and its programmatic activities when the National Science Foundation funding comes to an end. The Coalition leadership in conjunction with the individual engineering colleges and campus administrations need to develop and plan for the implementation of an appropriate legacy.

J. Industrial Involvement

SUCCEED continues to have a wide variety of industrial involvement—through program (and Coalition) evaluation / advisory roles, through direct financial support, and through contact with our students. Mentoring is the most active of these, usually incorporating some element of the advisory / support role. In cases where direct financial support is provided as a grant, and there is no additional industrial interaction, that support has been listed in the “Follow-on funding” section of Major Accomplishments, and this section is reserved for support that is accompanied by a relationship with an industrial partner.

Program evaluation / advising

SUCCEED’s EAB continues to play a more active role than is typical of such bodies. Each member serves both the Coalition as a whole and one focus area in particular in an advisory capacity. This closer relationship with the focus area within their expertise has tapped the expertise of our EAB in the process of design and implementation. This interaction has continued to be most significant in the OA area. In the past year, EAB input and influence was invaluable in the construction and testing of an employer feedback instrument and process.

Mentoring / Consulting to Students or Teams

This information is also presented in tabular form, but focuses on projects where industrial involvement was of a mentoring / consulting nature. While support level is included where the mentoring was accompanied by financial support, these figures *do not* include estimates of the value of the industry employee’s time.

| Activity supported | Supported by | Support level if available |
|---|--|----------------------------|
| Virginia Tech Virtual Corporations | Motorola | \$50,000 |
| | Lockheed-Martin part of a grant of | \$70,000 |
| | Westinghouse part of a grant of | \$60,000 |
| Cost estimating and ethics lectures at UNC Charlotte | local business professionals | |
| Virginia Tech Dissection Laboratory | Lockheed-Martin over three years | \$80,000 |
| | Several companies (dissection items) | \$12,000 ea. |
| NC State Women’s E-mail Corporate Mentoring Program | 33 mentor / mentee pairs have been connected | |
| “Automated Orientation Device to enhance the production of automotive tubeless tire valves” | Schrader-Bridgeport | \$9,800 |
| UF Integrated Product and Process Design | In addition to mentoring student teams, each of 24 companies contributes \$15,000 per project (27 projects in all) | \$405,000 |

| | | |
|--|--|----------|
| | to offset program expenses. There is a long list of past sponsors and potential sponsors for future projects. ²¹⁴ | |
| UNCC Mechanical / Electrical Engineering joint project | Caterpillar | \$10,000 |
| UNCC “An Emergency Medical Device to stabilize a fractured pelvis” | Carolinas Medical Center | \$14,800 |
| UNCC “Search and Discovery Tools in Intranet Environments” | First Union | |
| UNCC “Establishing Effective, Multi-University, Student Teams for Addressing Interdisciplinary Projects” | Ryobi, Torrington, Michelin, GE, Carolina Filter, and Alcoa Fujikura, Ltd. | |

K. Budget Information

This section includes a detailed description of allocations for the period September 1, 1999 through August 31, 2000, referred to as “Year 8” or “Y8.” Also included in this section is an itemized budget request for the period September 1, 2000 through August 31, 2001 (“Year 9” or “Y9”).

Funding was provided to the participating institutions by subcontracts for the annual period September 1, 1999 through August 31, 2000 of the cooperative agreement between the NSF and SUCCEED. The work to be performed under these subcontracts is a series of specific tasks. Each task is identified by a specific work statement under management by a designated principal investigator (PI). Each budget is required to specify a matching amount of cost sharing approved by the responsible institutional fiscal officer. Detailed budget allocations and matching funds for Year 8 follow.

This section includes a verification of cost sharing signed by each of the participating institutions for the time period 7/1/97 through 2/29/00.

These budget pages are replete with acronyms in order to avoid smaller print—please refer to Appendix I for a complete set of definitions.

SUCCEED YEAR 8

BUDGET ALLOCATED BY TASK (Period: Sept. 1, 1999 through August 31, 2000)

| School | Total | CIT | FD CFT | OA CFT | ST CFT | TBCD CFT | DT CST | A&E CST |
|-----------------------|--------------|--------------|------------|------------|------------|------------|------------|------------|
| CLEMSON | \$ 174,832 | \$ 139,500 | \$ 17,000 | \$ 14,000 | \$ - | \$ 4,332 | \$ - | \$ - |
| FAMU | \$ 81,368 | \$ 67,500 | \$ - | \$ - | \$ 9,999 | \$ - | \$ 3,869 | \$ - |
| FSU | \$ 89,500 | \$ 67,500 | \$ 12,000 | \$ - | \$ - | \$ 10,000 | \$ - | \$ - |
| GEORGIA TECH | \$ 227,714 | \$ 188,214 | \$ 13,500 | \$ 13,000 | \$ 10,000 | \$ 3,000 | \$ - | \$ - |
| NC A&T | \$ 182,500 | \$ 145,000 | \$ 9,500 | \$ 13,000 | \$ 10,000 | \$ 5,000 | \$ - | \$ - |
| NC STATE | \$ 493,949 | \$ 170,700 | \$ 113,301 | \$ 11,000 | \$ 54,952 | \$ 9,000 | \$ - | \$ 134,996 |
| UNCC | \$ 267,931 | \$ 139,100 | \$ 9,500 | \$ - | \$ 53,335 | \$ 10,000 | \$ 23,446 | \$ 32,550 |
| VIRGINIA TECH | \$ 341,280 | \$ 190,000 | \$ 13,500 | \$ 39,668 | \$ 20,000 | \$ 48,668 | \$ 29,444 | \$ - |
| UF | \$ 312,514 | \$ 190,000 | \$ 11,000 | \$ 29,140 | \$ 16,580 | \$ 10,000 | \$ 28,766 | \$ 27,028 |
| UF -ADMIN. | \$ 250,132 | | | | | | | |
| -RESERVE | \$ 35,000 | | | | | | | |
| Council of Schools | \$ 5,972 | | | | | | 5,972 | |
| Dissemination Reserve | \$ 37,308 | | | | | | 37,308 | |
| ALLOC. TOTAL | \$ 2,500,000 | \$ 1,297,514 | \$ 199,301 | \$ 119,808 | \$ 174,866 | \$ 100,000 | \$ 128,805 | \$ 194,574 |
| NSF FUNDS Y8 | \$ 2,500,000 | | | | | | | |

SUCCEED YEAR 8 - BUDGET ALLOCATION STATUS AS OF 4/30/00

50

| <u>SCHOOL</u> | <u>Task</u> | <u>PI</u> | <u>Approved NSF Funds</u> | <u>Match Promised</u> |
|---------------|-------------|----------------|-------------------------------|-----------------------|
| CLEMSON | CIT Team | Melsheimer | \$ 139,500 | \$ 366,093 |
| | FD CFT | Hirt | \$ 17,000 | \$ - |
| | OA CFT | Leonard/Nault | \$ 14,000 | \$ 17,302 |
| | TBCD CFT | Moss | \$ 4,332 | \$ - |
| | | s/t | \$ 174,832 | \$ 383,395 |
| FAMU | CIT Team | Awoniyi | \$ 67,500 | \$ 67,500 |
| | ST CFT | Haik | \$ 9,999 | \$ 10,000 |
| | DT CFT | Shih | \$ 3,869 | \$ 3,869 |
| FSU | | | \$ 81,368 | \$ 81,369 |
| | CIT Team | Awoniyi | \$ 67,500 | \$ 67,500 |
| | FD CFT | Buzyna | \$ 12,000 | \$ 12,000 |
| | TBCD CFT | Ritzenthaler | \$ 10,000 | \$ 12,000 |
| Ga Tech | | | \$ 89,500 | \$ 91,500 |
| | CIT Team | Lohmann | \$ 188,214 | \$ 188,214 |
| | FD CFT | Baker | \$ 13,500 | \$ 13,500 |
| | OA CFT | Marr/Hoey | \$ 13,000 | \$ 13,000 |
| | ST CFT | Mavis, Schrage | \$ 10,000 | \$ 10,000 |
| NC A&T | TBCD CFT | McClellan | \$ 3,000 | \$ 3,000 |
| | | | \$ 227,714 | \$ 227,714 |
| | CIT Team | Cheek | \$ 145,000 | \$ 190,115 |
| | FD CFT | murray | \$ 9,500 | \$ - |
| | OA CFT | Sarin | \$ 13,000 | \$ - |
| NC State | ST CFT | Owusu-Ofori | \$ 10,000 | \$ - |
| | TBCD CFT | Kelly | \$ 5,000 | \$ - |
| | | | \$ 182,500 | \$ 190,115 |
| | CIT Team | Rajala | \$ 170,700 | \$ 220,874 |
| | FD CFT | Brent/Felder | \$ 113,301 | \$ 30,707 |
| NC State | OA CFT | Ozturk | \$ 11,000 | \$ 11,000 |
| | ST CFT | Ollis | \$ 25,250 | \$ 17,376 |
| | ST CFT | Ollis | \$ 9,702 | \$ - |
| | TBCD CFT | Miller | \$ 9,000 | \$ - |
| | A&E CST | Zorowski | \$ 134,996 | \$ 40,046 |
| | ST CFT | Hren | \$ 10,000 | \$ - |
| | ST CFT | Fomaro | \$ 10,000 | \$ - |
| | | | \$ 493,949 | \$ 320,003 |

52

53

SUCCEED YEAR 8 - BUDGET ALLOCATION STATUS AS OF 4/30/00

| SCHOOL | Task | PI | Approved NSF Funds | Match Promised |
|-----------------------|--------------|-----------------------|--------------------|----------------|
| UNCC | CIT Team | Coleman | \$ 139,100 | \$ 150,427 |
| | DT-CST LDR. | Coleman | \$ 55,996 | \$ 14,220 |
| | FD CFT | Makki | \$ 9,500 | \$ 9,508 |
| | ST CFT | Phillips | \$ 53,335 | \$ 31,735 |
| | TBCD CFT | Price | \$ 10,000 | 0 |
| | | | \$ 267,931 | \$ 205,890 |
| <hr/> | | | | |
| Va Tech | CIT Team | Holzer | \$ 190,000 | \$ 356,844 |
| | FD CFT | Holzer | \$ 13,500 | \$ 13,500 |
| | OA CFT | Kurstedt | \$ 35,039 | \$ 17,534 |
| | ST CFT | Lu, Nelson, Borojevic | \$ 10,000 | \$ 10,003 |
| | ST CFT | Deisenroth | \$ 10,000 | \$ 10,000 |
| | OA CFT | Pappas | \$ 4,629 | |
| | TBCD CFT | Tront/Lockhart | \$ 36,668 | \$ - |
| | TBCD CFT | Midkiff | \$ 12,000 | \$ - |
| | DT CST | Tront | \$ 29,444 | \$ 29,450 |
| | | | \$ 341,280 | \$ 437,331 |
| <hr/> | | | | |
| UF | Admin | Anderson | \$ 250,132 | \$ 48,544 |
| | CIT Team | Latchman | \$ 190,000 | \$ 628,437 |
| | FD CFT | Glagola | \$ 11,000 | \$ 11,000 |
| | OA CFT | Elzinga | \$ 16,000 | \$ 16,000 |
| | OA CFT | Legg | \$ 4,380 | \$ - |
| | OA CFT | Consolazio | \$ 4,380 | \$ 4,380 |
| | OA CFT | Lindner | \$ 4,380 | \$ - |
| | ST CFT | Nishida | \$ 6,580 | \$ 20,000 |
| | ST CFT | O'Brien | \$ 10,000 | \$ 10,000 |
| | DT CST | Holt | \$ 28,766 | \$ 28,766 |
| | A&E CST | Ohland | \$ 27,028 | \$ 27,028 |
| | TBCD CFT | Latchman | \$ 10,000 | \$ 10,000 |
| | | UF S/T | \$ 562,646 | \$ 804,155 |
| <hr/> | | | | |
| Council of Schools | Miss State U | Reese | \$ 1,972 | \$ 1,972 |
| | SIU | Craddock | \$ 4,000 | \$ 7,865 |
| <hr/> | | | | |
| TOTAL ALLOCATED | | | \$ 2,427,692 | \$ 2,751,309 |
| RESERVE | | | \$ 35,000 | |
| Reserve Dissemination | | | \$ 37,308 | |
| TOTAL NSF BUDGET | | | \$ 2,500,000 | 110% |

SUCCEED YEAR 8 - (Period: Sept. 1, 1999 through August 31, 2000)

**FUNDS OBLIGATED / UNOBLIGATED
STATUS AT APRIL 30, 2000**

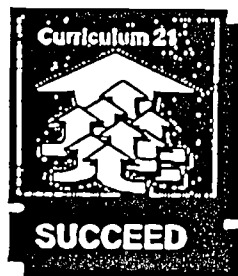
| | |
|---------------------------------------|---------------------|
| OBLIGATED | |
| SUBCONTRACTS - TEAMS FUNDING | \$ 1,865,046 |
| UNIVERSITY OF FLORIDA TEAMS | \$ 312,514 |
| UNIVERSITY OF FLORIDA ADMIN | \$ 250,132 |
| | <u>\$ 2,427,692</u> |
| UNOBLIGATED (as of 4/30/00) | \$ 37,308 |
| RESERVE | \$ 35,000 |
| TOTAL NSF FUNDS AWARDED YEAR 8 | \$ 2,500,000 |

SUCCEED COALITION -YEAR 8 ANNUAL REPORT - APRIL 2000

VERIFICATION OF COST SHARING

| | |
|---------------------------------|------------------------|
| CLEMSON UNIVERSITY | \$ 863,641.60 |
| FLORIDA A&M UNIVERSITY | \$ 153,066.48 |
| FLORIDA STATE UNIVERSITY | \$ 155,121.56 |
| GEORGIA TECH | \$ 244,891.58 |
| NORTH CAROLINA A&T UNIVERSITY | \$ 258,662.00 |
| NORTH CAROLINA STATE UNIVERSITY | \$ 755,531.00 |
| UNIVERSITY OF NC - CHARLOTTE | \$ 760,131.59 |
| UNIVERSITY OF FLORIDA | \$ 2,117,969.00 |
| VIRGINIA TECH UNIVERSITY | \$ 791,718.20 |
| | <u>\$ 6,100,733.01</u> |

(signed verification forms follow)



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

VERIFICATION OF COST SHARING SUCCEED COALITION

CLEMSON UNIVERSITY

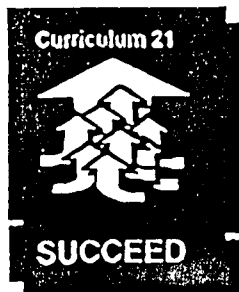
The Cost Sharing provided as of 3/9/00 for the time period 7/1/97 through
2/29/00 is:

Cumulative Cost Sharing

\$863,641.60

Verified: Roberta A. Elrod
Clemson University Sponsored Programs
Accounting and Administration

4/17/00



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succced@che.ufl.edu

VERIFICATION OF COST SHARING SUCCEED COALITION

FLORIDA A & M UNIVERSITY

The Cost Sharing provided as of 4/17/00 for the time period 7/1/97 through
2/29/00 is:

Cumulative Cost Sharing

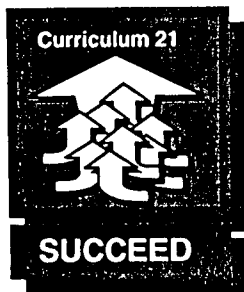
\$153,066.48

Verified:

Florida A&M University
Office of the Controller
Gregory JK. Schmidt
Assistant Controller

4/17/00

55



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

RECEIVED
CONTROLLER/S.R.A.S.
00 APR -5 PM 12:03

VERIFICATION OF COST SHARING SUCCEED COALITION

FLORIDA STATE UNIVERSITY

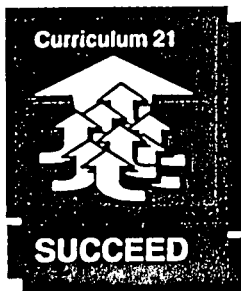
The Cost Sharing provided as of 3/14/00 for the time period 7/1/97 through
2/29/00 is:

Cumulative Cost Sharing

\$155,121.56

Verified: Jim Boudout by Rosameth Alvarado
The Florida State University
Contracts & Grants

4/17/00



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

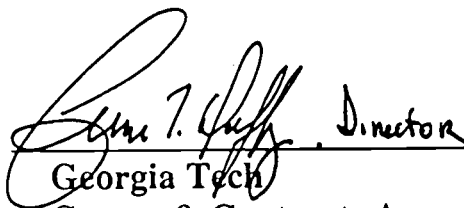
VERIFICATION OF COST SHARING SUCCEED COALITION

GEORGIA TECH

The Cost Sharing provided as of 3/13/00 for the time period 7/1/97 through
2/29/00 is:

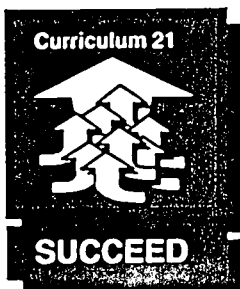
Cumulative Cost Sharing

\$244,891.58

Verified:  Director
Georgia Tech
Grants & Contracts Accounting

4/17/00

57



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

VERIFICATION OF COST SHARING SUCCEED COALITION

NORTH CAROLINA A&T STATE UNIVERSITY

The Cost Sharing provided as of 3/18/00 for the time period 7/1/97 through
2/29/00 is: \$258,662.00

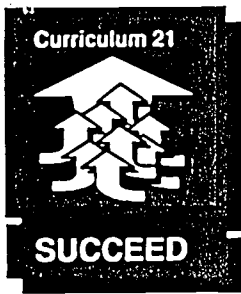
Cumulative Cost Sharing

\$258,662.00

PAW 4/13/00
CEL 4/13/00
Paula Jeffries / sm 4/13/00
Verified: Paula Jeffries, Interim Vice Chancellor for Fiscal Affairs
North Carolina A&T State University
Office of Contracts & Grants

4/17/00

58



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

VERIFICATION OF COST SHARING SUCCEED COALITION

NORTH CAROLINA STATE UNIVERSITY

The Cost Sharing provided as of 3/30/00 for the time period 7/1/97 through
2/29/00 is:

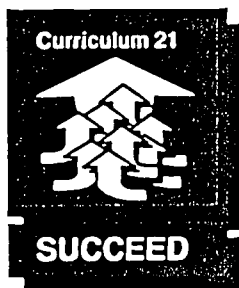
Cumulative Cost Sharing

\$755,531.00

Verified: Carl N. Pullian, (SSB)
Sharon M. Boyd, Asst. Director
North Carolina State University
Office of Contracts & Grants

4/17/00

59



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

VERIFICATION OF COST SHARING SUCCEED COALITION

UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The Cost Sharing provided as of 3/3/00 for the time period 7/1/97 through
2/29/00 is:

Cumulative Cost Sharing

\$760,131.59

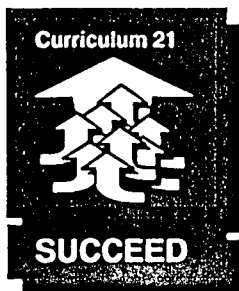
Verified: _____


University of North Carolina at Charlotte
Financial Services/Sponsored Programs

4/17/00

60

66



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

VERIFICATION OF COST SHARING SUCCEED COALITION

UNIVERSITY OF FLORIDA

The Cost Sharing provided for the time period 7/1/97 through 3/31/00 is:

Cumulative Cost Sharing

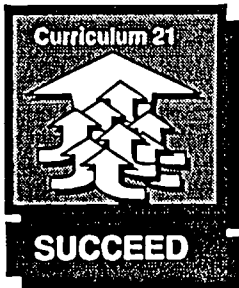
\$ 2,117,969.

Verified: _____

Jan Reh
University of Florida
Fiscal & Personnel Office

4/17/00

61



Southeastern University and College Coalition for Engineering Education

University of Florida
P. O. Box 116134
Gainesville, FL 32611-6134

Telephone: (352) 392-4100
Facsimile: (352) 392-4126
E-mail: succeed@che.ufl.edu

VERIFICATION OF COST SHARING SUCCEED COALITION

VIRGINIA POLYTECHNIC INSTITUTE & STATE UNIVERSITY

The Cost Sharing provided as of 3/8/00 for the time period 7/1/97 through
2/29/00 is:

Cumulative Cost Sharing

\$791,718.20

Verified:  4/6/00
Virginia Tech State University
Office of Sponsored Programs

4/17/00

SUMMARY PROPOSAL BUDGET

YEAR 9 (9/1/00-8/31/01)

| SUMMARY PROPOSAL BUDGET | | | | | | FOR NSF USE ONLY | | | |
|--|---|--|--|--|--|--|-------------------|---------------|----------------|
| ORGANIZATION | | | | | | PROPOSAL NO. | DURATION (MONTHS) | | |
| UNIVERSITY OF FLORIDA | | | | | | | Proposed | Granted | |
| PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR | | | | | | AWARD NO. | | | |
| DR. TIMOTHY J. ANDERSON | | | | | | | | | |
| A. SENIOR PERSONNEL: PI/PD, Co-PIs, Faculty & Other Senior Associates (List each separately with title; A.6. show number in brackets) | | | | | | SUCCEED Funded | | SUCCEED Funds | Funds |
| | | | | | | Person-mos. | | Requested By | Granted By NSF |
| | | | | | | CAL | ACAD | Proposer | (IF DIFFERENT) |
| 1. | T. J. ANDERSON - DIRECTOR | | | | | 3 | 0 | 40,789 | \$ 0 |
| 2. | | | | | | 0 | 0 | 0 | 0 |
| 3. | | | | | | 0 | 0 | 0 | 0 |
| 4. | | | | | | 0 | 0 | 0 | 0 |
| 5. | | | | | | 0 | 0 | 0 | 0 |
| 6. | () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE) | | | | | 0 | 0 | 0 | 0 |
| 7. | () TOTAL SENIOR PERSONNEL (1-5) | | | | | 3 | 0 | 40789 | 0 |
| B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) | | | | | | | | | |
| 1. | (1) POST-DOCTORAL ASSOCIATES | | | | | 12 | 0 | 45,456 | 0 |
| 2. | () OTHER PROFESSIONALS | | | | | 0 | 0 | 0 | 0 |
| 3. | (3) GRADUATE STUDENTS | | | | | | | 57,000 | 0 |
| 4. | () UNDERGRADUATE STUDENTS | | | | | | | 0 | 0 |
| 5. | () SECRETARIAL-CLERICAL | | | | | 12 | | 21,000 | 0 |
| 6. | () OTHER (Res. Coord.) + Mentors/Tutors | | | | | 12 | | 46,115 | 0 |
| TOTAL SALARIES AND WAGES(A+B) | | | | | | | | 210,360 | 0 |
| C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)19% of A7,B5, B6, 8.3%B.1 /\$392/mm health | | | | | | | | 34,859 | 0 |
| TOTAL SALARIES, WAGES AND FRINGE BENEFITS | | | | | | | | 245,219 | 0 |
| D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000:) | | | | | | | | | |
| TOTAL PERMANENT EQUIPMENT Funds Requested from NSF | | | | | | | | 5,500 | 0 |
| E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) | | | | | | | | 45,000 | 0 |
| 2. FOREIGN (ICEE) | | | | | | | | 15,000 | 0 |
| F. PARTICIPANT SUPPORT COSTS | | | | | | | | | |
| 1. | STIPENDS \$ 0 | | | | | | | | |
| 2. | TRAVEL 0 | | | | | | | | |
| 3. | SUBSISTENCE 0 | | | | | | | | |
| (0) TOTAL PARTICIPANT COSTS | | | | | | | | 0 | 0 |
| G. OTHER DIRECT COSTS | | | | | | | | | |
| 1. | MATERIALS AND SUPPLIES | | | | | | | 20,375 | 0 |
| 2. | PUBLICATION COSTS / Documentation / Dissemination / Final reporting costs | | | | | | | 18,300 | 0 |
| 3. | CONSULTANT SERVICES | | | | | | | 0 | 0 |
| 4. | COMPUTER (ADPE) SERVICES | | | | | | | 0 | 0 |
| 5. | SUBCONTRACTS | | | | | | | 1,944,250 | 0 |
| 6. | OTHER (INCL FOOD COSTS \$5,000, \$3184 TUITION X 3) | | | | | | | 36,000 | 0 |
| TOTAL OTHER DIRECT COSTS | | | | | | | | 2,018,925 | 0 |
| H. TOTAL DIRECT COSTS (A THROUGH G) | | | | | | | | 2,329,644 | 0 |
| I. INDIRECT COSTS (SPECIFY RATE AND BASE) | | | | | | | | | |
| 46% MTDC (-d, -5g, -tuition) | | | | | | | | | |
| TOTAL INDIRECT COSTS | | | | | | | | 170,356 | 0 |
| J. TOTAL DIRECT AND INDIRECT COSTS (H+I) | | | | | | | | 2,500,000 | 0 |
| K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPM 252 AND 253) | | | | | | | | 0 | |
| L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K) | | | | | | | | \$ 2,500,000 | \$ 0 |
| M. COST SHARING: PROPOSED LE' 2,500,000 | | | | | | AGREED LEVEL IF DIFFERENT \$ | | | |
| PI/PD TYPED NAME & SIGNATURE* | | | | | | FOR NSF USE ONLY | | | |
| Dr. Timothy J. Anderson | | | | | | INDIRECT COST RATE VERIFICATION | | | |
| INST. REP. TYPED NAME & SIGNATURE | | | | | | Date Checked Date of Rate Sheet Initials-DGC | | | |

SUCCEED YEAR 9 - PERIOD: Sept. 1, 2000 through AUGUST 31, 2001

PROPOSED BUDGET BY MAJOR AREAS

| | | |
|--|-----------|------------------|
| CAMPUS IMPLEMENTATION TEAMS | \$ | 1,435,000 |
| DISSEMINATION TEAM | \$ | 250,000 |
| <ul style="list-style-type: none"> - FACULTY DEVELOPMENT CFT - OUTCOMES ASSESSMENT CFT - STUDENT TRANSITION CFT - TECHNOLOGY BASED CURRICULUM DELIVERY CFT | \$ | 450,000 |
| ASSESSMENT & EVALUATION | \$ | 80,000 |
| ADMINISTRATION | \$ | 250,000 |
| RESERVE | \$ | 35,000 |
| PROPOSED NSF TOTAL BUDGET | \$ | 2,500,000 |

Appendix I. Glossary of Acronyms

SUCCEED Southeastern University and College Coalition for
Engineering Education

SUCCEED's institutions

| | |
|----------------------------|---|
| Ga Tech, Georgia Tech, GT | Georgia Institute of Technology |
| FAMU | Florida A&M University |
| FSU | Florida State University |
| NCAT, NC A&T | North Carolina A&T State University |
| NC State, NCSU | North Carolina State University |
| UF | University of Florida |
| UNC C, UNCC, UNC-C | University of North Carolina at Charlotte |
| Va Tech, Virginia Tech, VT | Virginia Polytechnic Institute and State University |

SUCCEED personnel and affiliates

| | |
|-----|----------------------------|
| CFT | Coalition Focus Team |
| CIT | Campus Implementation Team |
| CST | Coalition Service Team |
| COS | Council of Schools |
| PI | Principal Investigator |
| EAB | External Advisory Board |

SUCCEED focus areas

| | |
|------|--------------------------------------|
| FD | Faculty Development |
| OA | Outcomes Assessment |
| ST | Student Transitions |
| TBCD | Technology-Based Curriculum Delivery |

SUCCEED Council of Schools members

| | |
|------|--|
| PUPR | Polytechnic University of Puerto Rico |
| SIUC | Southern Illinois University at Carbondale |
| UPR | University of Puerto Rico (Mayaguez) |
| MSU | Mississippi State University |

Organizations, administrative units, and conferences

| | |
|---------|--|
| AAES | American Association of Engineering Societies |
| ABET | Accreditation Board for Engineering and Technology |
| ASEE | American Society of Engineering Education |
| EC 2000 | Engineering Criteria 2000 |
| CES | College of Engineering and Science (at Clemson) |
| COE | College of Engineering |
| FIE | Frontiers in Education Conference |
| ICEE | International Conference on Engineering Education |
| NSF | National Science Foundation |

Appendix II. References

- ¹ <http://www.edtech.vt.edu/idi/fdi/FDI.html>
- ² M. J. Marr, E. W. Thomas, M. R. Benne, A. Thomas, and R. M. Hume, "Development of instructional systems for teaching an electricity and magnetism course for engineers," *Amer. J. Phys.* **67**(9) 789-802, Sept. 1999.
- ³ Thomas, A., M.B. Benne, M.J. Marr, E.W. Thomas, and R.M. Hume, "The evidence remains stable: MBTI predicts attraction and attrition in engineering programs," *Journal of Psychological Type*, *in press*.
- ⁴ [Goff\SECPRO98.doc](#)
- ⁵ [Goff\CEUT SUCCEED 1098.ppt](#)
- ⁶ [Goff\LAB renovation 999.ppt](#)
- ⁷ [Goff\FRITH LAB OPENHOUSE 499.ppt](#)
- ⁸ [Goff\SECPRO00.doc](#)
- ⁹ [Goff\SEC00.ppt](#)
- ¹⁰ [Hirt\CCLI-EMD_Abstract_\(Hirt\).doc](#)
- ¹¹ <http://www.multimedia.vt.edu/streaming/oct99/>
- ¹² http://www.eng.fsu.edu/education/distance_learning/
- ¹³ [Brent\ASEE99-FD.PPT](#)
- ¹⁴ [Brent\ASEE00-MCFD.doc](#)
- ¹⁵ [Brent\ASEE00-FD.doc](#)
- ¹⁶ [Brent\Mentoring.ppt](#)
- ¹⁷ [Brent\NB-mentoring.doc](#)
- ¹⁸ [Brent\Mentoring-rept8-99-Clemson.doc](#)
- ¹⁹ [Brent\Mentoring-rept11-99-NCSU.doc](#)
- ²⁰ Recall that Clemson has a College of Engineering and Science.
- ²¹ Makki, Rafic, "Faculty Development Handbook," UNC Charlotte, William States Lee College of Engineering, December 1999. For more information, contact succeed@che.ufl.edu or call 352-392-4000.
- ²² <http://www.coe.uncc.edu/dept/ece/succeed>
- ²³ Kohut, Gary, Debbie Langsam, Rafic Makki, Mike Pearson, and Pamela Sofras, "Peer Observation of Teaching: Avoiding the Land Mines and Making It Work," *Eighth AAHE Conference on Faculty Roles and Rewards*, February 2000.
- ²⁴ Kohut, Gary F., Deborah M. Langsam, Rafic Z. Makki, Michael A. Pearson, Pamela A. Sofras, and Kathleen B. Yancey, "Peer Observation of Teaching: Strategies for Interpreting the Write-Up Right," *The Department Chair: A Newsletter for Academic Administrators* **10**(1), 4-5, Summer 1999.
- ²⁵ Holzer, Siegfried, and Raul Andruet, "Building an Engineering Learning Community at Virginia Tech," *1999 ASEE Annual Conference*, Charlotte, NC, June 20-23, 1999.
- ²⁶ <http://www.ceut.vt.edu/>
- ²⁷ <http://www.edtech.vt.edu/idi/fdi/FDI.html>
- ²⁸ "Mentoring and Supporting New Faculty Members: A Teaching Leader Seminar," Richard Felder and Rebecca Brent, Virginia Tech, on April 25, 2000. Workshop notebook on file; contact succeed@che.ufl.edu or call 352-392-4000.
- ²⁹ SUCCEED Engineering Learning Community Meetings on "Effective Teaching," Virginia Tech, November 18, 1999 (32 participants), March 9, 2000 (22 participants), and May 4, 2000.
- ³⁰ "Principles of Good Practice in Science and Engineering Education," Virginia Tech, Two identical, half-day workshops sponsored by CEUT-SUCCEED on September 29 and 30, 1999 (62 participants). Slides available at [<Holzer\CEUT-SUCCEED Workshop Kander.pdf>](#).
- ³¹ "Teaching with Cases: Benefits and Challenges," June West and Jim Clawson, hosted by Virginia Tech's Center for Excellence in Undergraduate Teaching (CEUT) and SUCCEED, April 5, 2000.
- ³² "Designing a Course for On-line Delivery: A Case Study," Virginia Tech, Half-day SUCCEED Workshop, April 21, 2000.
- ³³ [Baker\1999-2000-activities.ppt](#)
- ³⁴ Baker, Nelson, "Effective Teaching with Technology," workshop notebook on file. Contact succeed@che.ufl.edu or call 352-392-4000 for more information.
- ³⁵ [Baker\learning-with-web.ppt](#)

- ³⁶ [Baker\classroom-assessment-seminar.ppt](#)
- ³⁷ <http://epitome.ce.gatech.edu/~iowa/>
- ³⁸ [Baker\succeed-coll.xls](#)
- ³⁹ [Brent\NCSU 8-27-99 Orientation to Teaching Workshop.doc](#)
- ⁴⁰ [Brent\Brent-Incentives-Rewards.doc](#)
- ⁴¹ [Brent\Tch-Scholarship00.ppt](#)
- ⁴² [Brent\tr_scholarly.doc](#)
- ⁴³ [Brent\FIE98FD.ppt](#)
- ⁴⁴ Brawner, C., R. Felder, R. Brent, T. Miller, and R. Allen. Faculty Teaching Practices in an Engineering Education Coalition. Proceedings. 1999 Frontiers in Education Annual Conference, San Juan, PR, November 1999. PowerPoint slides available at <[Brent\FIE99 faculty dev.ppt](#)>.
- ⁴⁵ Brent, R., R.M. Felder, D. Hirt, D. Switzer, and S. Holzer, "A Model Program for Promoting Effective Teaching in Colleges of Engineering," *1999 ASEE Annual Conference Proceedings*, ASEE, June 1999.
- ⁴⁶ Employer Feedback, workshop, Charlotte, NC, September 17-18, 1999, notebook on file. Contact succeed@che.ufl.edu or call 352-392-4000 for more information.
- ⁴⁷ Preparing for ABET EC 2000: The Complete Guide, workshop, Greensboro, NC, March 28-29, 2000, notebook on file. Contact succeed@che.ufl.edu or call 352-392-4000 for more information.
- ⁴⁸ [Shelnutt\ASPIREppt.ppt](#)
- ⁴⁹ [Shelnutt\UNCC-ABET Continuous Improvement Summary.doc](#)
- ⁵⁰ [Shelnutt\UNCC Employer Survey Results 97&99.doc](#)
- ⁵¹ Sarin, Sanjiv, Bala Ram, Ganelle Moultry-Gloster, Eui Park, Celestine Ntuen, Arup Mallik, Silvanus Udoka, Charles Vandezande, Herbert Nwankwo, Samantha Wright, Phillip Mintz, and Paul Stanfield, "Curriculum Renewal in Response to ABET EC 2000 Requirements," *Proc. Frontiers in Education 1999*, San Juan, Puerto Rico, November 1999. Slides available at <[Sarin\Sarin FIE 99 Curr Rev Paper.ppt](#)>.
- ⁵² Sarin, Sanjiv, "Quality Assurance in Engineering Education: A Comparison of EC-2000 and ISO-9000," accepted for publication, *J. Eng. Ed.* Available at <[Sarin\Sarin Paper Accepted in Jour of Engg Edu.doc](#)>.
- ⁵³ Sarin, Sanjiv, "Enhancing and Measuring the 'Difficult/Soft' EC 2000 Outcomes," Poster presentation at *2000 SUCCEED Annual Conference*, Greensboro, NC, March 28-29, 2000. PowerPoint slides available at <[Sarin\Sarin SUCCEED Meeting March 28-29, 2000.ppt](#)>.
- ⁵⁴ [Sarin\Sarin Working Paper on Enhancing and Assessing Soft Outcomes.doc](#)
- ⁵⁵ <http://www.succeed.vt.edu/products/oaworkshop/Presentation-Sarin/tsld001.htm>
- ⁵⁶ [Marr\engassmtlet.doc](#)
- ⁵⁷ [Marr\PTMGTEAS.doc](#)
- ⁵⁸ [Marr\gteeaspre1.doc](#)
- ⁵⁹ [Marr\SCHEDULE OF SUCCEED ASSESSMENT SEMINARS 99.doc](#)
- ⁶⁰ [Marr\assessment list 11899.doc](#)
- ⁶¹ [Marr\CHECKLISTS&SCALES.ppt](#)
- ⁶² [Marr\EMPLOYER WORKSHOP SLIDES2.ppt](#)
- ⁶³ [Ozturk\ECE_200_\(for_Succeed\).ppt](#)
- ⁶⁴ [Ozturk\Curriculum_Report.doc](#)
- ⁶⁵ [Ozturk\IAB_Presentation.ppt](#)
- ⁶⁶ [Leonard\Leonard Y8 Prog Rep CFT\ECE Focus Group Session Notes.doc](#)
- ⁶⁷ [Leonard\Leonard Y8 Prog Rep CFT\IE and CME Focus Group Session Notes.doc](#)
- ⁶⁸ [Leonard\Leonard Y8 Prog Rep CFT\99-00 Prog Report Leonard CFT.ppt](#)
- ⁶⁹ Scales, K., C. Owen, S. Shiohare, and M. Leonard, "Preparing for Program Accreditation Review Under ABET Engineering Criteria 2000: Choosing Outcome Indicators," *Journal of Engineering Education* **87**(3), 207-210, July 1998.
- ⁷⁰ Owen, Christi, Katherine Scales, and Michael Leonard, "Preparing for Program Accreditation Review Under ABET Engineering Criteria 2000: Creating a Database of Outcomes and Outcome Indicators for a Variety of Engineering Programs," *Journal of Engineering Education* **88**(3), 255-259, July 1999. Manuscript available at <[Leonard\Leonard Y8 Prog Rep CIT Benchmk\ASEE Database Article.doc](#)>.
- ⁷¹ [Leonard\Leonard Y8 Prog Rep CIT Benchmk\99-00 Prog Report Leonard Bench.ppt](#)
- ⁷² [Leonard\Leonard Y8 Prog Rep CIT Cur Ren\99-00 Prog Report Leonard CIR.ppt](#)
- ⁷³ Leonard, Michael S., "Using Outcomes Assessment Data to Review/Improve Curriculum," Poster presentation at *2000 SUCCEED Annual Conference*, Greensboro, NC, March 28-29, 2000. PowerPoint

slides available at <Leonard\Leonard Y8 Prog Rep CIT Cur Ren\SUCCEED_Gbo Workshop_OA-CIR Integrate.ppt >.

⁷⁴ <http://www.eng.fsu.edu/education/succeef/e.prof.pdf>

⁷⁵ <http://www.eng.fsu.edu/departments/industrial/academics/oaproject/iv.html>

⁷⁶ <http://www.ise.ufl.edu/ippd/>

⁷⁷ <http://www.ise.ufl.edu/ippd/sponsors.htm>

⁷⁸ http://www.ise.ufl.edu/ippd/99_00.htm

⁷⁹ <http://www.ise.ufl.edu/ippd/faculty.htm>

⁸⁰ Goff\FRITH LAB OPENHOUSE 499.ppt

⁸¹ Awarded in Dallas, TX, November 1997.

⁸² Dixon, Marvin, "Teaching Tomorrow's Engineers", Mechanical Engineering, July 1996, pp. 64-69.

⁸³ *Anderson Independent*, December 2, 1995.

⁸⁴ *Greenville News*, December 31, 1995.

⁸⁵ *The State*

⁸⁶ *Clemson World*, Clemson Alumni Magazine

⁸⁷ Dixon, Marvin, Waste Management Conference, Tucson, AZ. March 4, 1997.

⁸⁸ Dixon, Marvin, National Safety Council Meeting, Chicago, IL, September 17, 18, 1996.

⁸⁹ Dixon, Marvin, SUCCEED Conference, Roanoke, VA, March 1997.

⁹⁰ Dixon, Marvin, SUCCEED Conference, Charlotte, NC, March 1998.

⁹¹ Dixon, Marvin, ASEE Conference, Milwaukee, WI, June 1997.

⁹² Dixon, Marvin, "Establishing Effective Multi-University Student Teams for Addressing Interdisciplinary Design Projects," *Proceedings ASEE Conference*, Seattle, WA, June 1998.

⁹³ Dixon, Marvin, ASEE Southeastern Meeting, Spring 1999.

⁹⁴ <http://www.coe.uncc.edu/~mentor>

⁹⁵ Tolley\MAPS brochure.doc

⁹⁶ Tolley, Patricia A., Stephen C. Myers, and Catherine Blat, "Putting the Pieces Together: How to Build Dynamic, Interactive, and Sustainable Student Learning Communities to Improve Retention in Science, Math, and Engineering," *Sixth National Conference on Students in Transition*, National Resource Center for the First Year Experience and Students in Transition in St. Louis, November 1999. (PowerPoint slides available at <Tolley\FYE finished.ppt>.)

⁹⁷ http://www.coe.uncc.edu/freshman_engineering/engr1201/

⁹⁸ http://www.coe.uncc.edu/freshman_engineering/engr1202/

⁹⁹ Tolley\Transfer Articulation Example.xls

¹⁰⁰ Tolley\Bethune Facts.doc

¹⁰¹ Pratt, Christopher, and Jimmie L. Cochran, "A Global Context for Learning: A Strategic Investment," *Proc. CIEC 2000* (Conference for Industry and Education Collaboration sponsored by the American Society for Engineering Education), January 31- February 4, 2000. PowerPoint slides available <Tolley\CIEC-CED-ASEE PowerPoint cp SLIDE SHOW 1-31-001.ppt>.

¹⁰² Owusu-Ofori\Progress.ppt

¹⁰³ Loganathan, G.V., William Greenberg, Lorraine Holub, Craig Moore, "Experiments for Teaching Calculus," Poster presentation at *2000 SUCCEED Annual Conference*, Greensboro, NC, March 28-29, 2000. PowerPoint slides available at <Loganathan\ESPCalc1.ppt>.

¹⁰⁴ Loganathan, G.V., William Greenberg, Lorraine Holub, Craig Moore, "Experiments for Teaching Calculus," abstract, *ASEE Southeastern Section Conference*, Clemson, SC, April 11-13, 1999.

¹⁰⁵ Loganathan, G.V., William Greenberg, Lorraine Holub, Craig Moore, "The deflected beam in differential calculus: Bringing engineering into the mathematics classroom," *1999 ASEE Conference*, Session 3565, Charlotte, North Carolina, June 20-23, 1999.

¹⁰⁶ Sil\COURSE REVISION SLIDES.ppt

¹⁰⁷ Sil\FIRST CLASS SLIDES.ppt

¹⁰⁸ Lu\MD Packaging Course Objective (GQ Lu).ppt

¹⁰⁹ <http://www.ee.vt.edu/virtcorp/>

¹¹⁰ <http://www.perts.ece.vt.edu/syllabus.htm>

¹¹¹ <http://univrelations.unirel.vt.edu/vtmag/fall99/feature2.html>

¹¹² <http://univrelations.unirel.vt.edu/vtmag/spring99/feature3.html>

¹¹³ <http://www.ecpe.vt.edu/ecenews/fall99/wlan.html>

- ¹¹⁴ <http://www.ecpe.vt.edu/ecenews/ar00/index.html>
- ¹¹⁵ [Ramu\grading.doc](#)
- ¹¹⁶ [Ramu\cat.doc](#)
- ¹¹⁷ [Ramu\csa.ppt](#)
- ¹¹⁸ <http://www.perts.ece.vt.edu/>
- ¹¹⁹ [Ramu\VC PERTS.ppt](#)
- ¹²⁰ <http://www.disc.vt.edu/>
- ¹²¹ Ollis, David, Howard Phillips, Kenneth Murray, and Jack Hebrank, "Multidisciplinary Design: Grow Stronger Programs Eight Ways," *The Innovator of SUCCEED* #11, Summer 1999.
- ¹²² Ohland, M.W., T.J. Anderson, D.F. Ollis, D.H. Phillips, K.H. Murray, and J. Hebrank, "Nine Approaches to Including Multidisciplinary Design in the Curriculum," *International Conference on Engineering Education 1999*, Invited Lecture presented by Tim Anderson, Ostrava and Prague, Czech Republic, August 8-14, 1999, published in proceedings on CD-ROM, paper 340, 9 pages.
- ¹²³ Luyendyk, S., D. Ollis, "Integrating Freshman Writing and Engineering," Liberal Education Division, ASEE 2000, not included in proceedings.
- ¹²⁴ Brown, A., S. Luyendyk, D. Ollis, "Implementing a Large Scale Collaboration between English and Engineering," in press in *Liberal Education for 21st Century Engineering: Responses to ABET/EC 2000*, D. Ollis, K. Neeley, and H. Luegenbiehl (eds), Peter Lang Publishers, NY, 2000 (Dec.) est. publication date.
- ¹²⁵ [Watford\Succed April Report.ppt](#)
- ¹²⁶ Haik, Yousef, "MDTC: Multidisciplinary Design and Training Clinic—A Center for Multidisciplinary Interaction Between Engineering Education and Industry," brochure produced by the Florida A&M University—Florida State University College of Engineering, further information available at <http://www.eng.fsu.edu/mdtc>.
- ¹²⁷ Connor, Jeffrey, "Integration of Design in First Year Engineering Curriculum," Poster presentation at 2000 SUCCEED Annual Conference, Greensboro, NC, March 28-29, 2000. PowerPoint slides available at [Connor\Connor Poster No photo.ppt](#).
- ¹²⁸ [Haugh\HaughSucceedApril2000.ppt](#)
- ¹²⁹ [Haugh\HaughSeniorDesignsAdvisersSophomores.doc](#)
- ¹³⁰ [Haugh\HaughNewSophomoreDesignExperiencesApr2000.doc](#)
- ¹³¹ [Mavis\Report.pdf](#)
- ¹³² [Mavis\dbf_v3.ppt](#)
- ¹³³ [Mitchell\NCEE yearlong acclimation model.doc](#)
- ¹³⁴ [Mitchell\NCEE Summer Transition Program Abstract.doc](#)
- ¹³⁵ [Mitchell\NCEE CMED abstract.doc](#)
- ¹³⁶ [Mitchell\FIEK-12presentation.ppt](#)
- ¹³⁷ [Mitchell\FIE99 presentation.ppt](#)
- ¹³⁸ [Moore\SUCCEED Report Data for April 2000.ppt](#)
- ¹³⁹ [Philobos\ECC presentation.ppt](#)
- ¹⁴⁰ [Philobos\mm.ppt](#)
- ¹⁴¹ Porter, Richard L., Laura J. Bottomley, Mary Clare Robbins, Sarah A. Rajala, Hugh Fuller, and Walthea V. Yarbrough, "Introduction to Engineering Problem Solving – A New Course for 1100 First Year Engineering Students," 1999 Proc. American Society of Engineering Education, Session 2353, June 1999. PowerPoint slides available at [Robbins\Robbins ppt 1.ppt](#).
- ¹⁴² [Robbins\Robbins ppt 2.ppt](#)
- ¹⁴³ Weinberg, Gary and Laura J. Bottomley, "A Novel Freshman Engineering Honors Project," *Proc. ASEE 2000 Annual Conference*, Charlotte, NC.
- ¹⁴⁴ Jones, Ray A., and Laura J. Bottomley, "Teaching Electrical Safety: Kindergarten to Emeritus," *Petrochemical Industry Conference (PCIC)*, September 2000.
- ¹⁴⁵ Bottomley, Laura J., Sarah Rajala and Richard Porter, "Engineering Outreach Teams: K-12 Outreach at North Carolina State University," *Proc. Frontiers in Education 1999*, San Juan, Puerto Rico.
- ¹⁴⁶ Bottomley, Laura J., Elizabeth A. Parry, Sara Washburn, Amy Hossain, Rachel Meyer, "Engineering Students in K-12 Schools," *Proc. ASEE 2000 Annual Conference*, Charlotte, NC.
- ¹⁴⁷ Bottomley, Laura J., Sarah Rajala and Richard Porter, "Women in Engineering at North Carolina State University: An Effort in Recruitment, Retention, and Encouragement," *Proc. Frontiers in Education 1999*, San Juan, Puerto Rico.

- ¹⁴⁸ Moss, Bill, "Distance Learning Using WebCT," *First International WebCT Conference*, June 1999. Available at <<http://sequoyah.math.clemson.edu:7070/ramgen/RealMedia/webct-dl/audio.smi>>.
- ¹⁴⁹ Moss, Bill, "Mathematics in WebCT," *First International WebCT Conference*, June 1999. Available at <http://www.math.clemson.edu/~bmoss/math_on_web/math.htm>.
- ¹⁵⁰ Moss, Bill, "RealSystem G2 Streaming Mini-Lectures," *First International WebCT Conference*, June 1999. Available at <<http://www.math.clemson.edu/~bmoss/streaming/streamv4.htm>>.
- ¹⁵¹ <http://www.ces.clemson.edu/webct>
- ¹⁵² http://www.ces.clemson.edu/webct/admin_registration.html
- ¹⁵³ Sherrod, Laurie, and Bill Moss, Clemson College of Engineering and Science Pilot Laptop Program Brochure. Available at <http://www.math.clemson.edu/~bmoss/tbcd/laptop_brochure.pdf>.
- ¹⁵⁴ Sherrod, Laurie, Clemson College of Engineering and Science Laptop Program Orientation Presentation. Available at <<http://www.people.clemson.edu/~laurie/orientation99.pdf>>.
- ¹⁵⁵ Sherrod, Laurie, Laptop Workshop Instructions. <http://www.people.clemson.edu/~laurie/workshop99.pdf>
- ¹⁵⁶ [Melsheimer\Assessment F99.doc](#)
- ¹⁵⁷ Weaver, Barbara, "Integrating Technology with English Course Content," Available at <<http://www.math.clemson.edu/~bmoss/tbcd/weaver.doc>>.
- ¹⁵⁸ Sherrod, Laurie, Laptop Program Preparation Presentation, UCF-Dell Laptops in the Classroom Conference, February 2000. Available at <http://www.people.clemson.edu/~laurie/prep.ppt>
- ¹⁵⁹ Sherrod, Laurie, Laptop Program Project Load Presentation, UCF-Dell Laptops in the Classroom Conference, February 2000. Available at <<http://www.people.clemson.edu/~laurie/projload.ppt>>.
- ¹⁶⁰ Sherrod, Laurie, Laptop Program Support Presentation, UCF-Dell Laptops in the Classroom Conference, February 2000. Available at <<http://www.people.clemson.edu/~laurie/support.ppt>>.
- ¹⁶¹ Moss, Bill, and Laurie Sherrod, Pilot Laptop Program Overview Presentation, *SUCCEED 2000 Annual Meeting*, Greensboro, NC, March 28-29, 2000. Available at <http://www.math.clemson.edu/~bmoss/tbcd/laptop_overview.ppt>.
- ¹⁶² Sherrod, Laurie, Pilot Laptop Program, *ASEE-SE Conference Proceedings*, April 1999 Available at <<http://www.math.clemson.edu/~bmoss/asee-se1.pdf>>.
- ¹⁶³ Moss, Bill, "Developing and Implementing a Pilot Laptop Program," UCF-Dell Laptops in the Classroom Conference, February 2000. HTML: <<http://www.math.clemson.edu/~bmoss/developC.htm>> or PowerPoint: <<http://www.math.clemson.edu/~bmoss/develop.ppt>>.
- ¹⁶⁴ Moss, Bill, "Getting the Most Out of Clemson Smart Classrooms," UCF-Dell Laptops in the Classroom Conference, February 2000 Available in HTML at <<http://www.math.clemson.edu/~bmoss/smartC.htm>> or PowerPoint at <<http://www.math.clemson.edu/~bmoss/smart.ppt>>.
- ¹⁶⁵ Moss, Bill, Laptop Program Time Line. http://www.math.clemson.edu/~bmoss/tbcd/Time_line.doc
- ¹⁶⁶ <http://www.ces.clemson.edu/~dbruce>
- ¹⁶⁷ [Price\DETA.doc](#)
- ¹⁶⁸ <http://www.mechatronics.me.vt.edu/mechadesign/index.html>
- ¹⁶⁹ Latchman, H.A., Ch. Salzmman, D. Gillet, and Hicham Bouzekri, "Information Technology Enhanced Learning in Distance and Conventional Education." *IEEE Trans. Ed.* **42**(4), 247-254, (November 1999).
- ¹⁷⁰ <http://www.list.ufl.edu/lectures-on-demand/icee.html>
- ¹⁷¹ http://www.eng.fsu.edu/education/distance_learning/
- ¹⁷² *Eprof* newsletter, Braketta Ritzenthaler, editor, **1**(1). Contact braketta@eng.fsu.edu for information.
- ¹⁷³ [McClellan\GT-Lecture-Tool.ppt](#)
- ¹⁷⁴ <http://www.ece.gatech.edu/streaming>
- ¹⁷⁵ Midkiff, Scott, "Using the Web for Synchronous and Asynchronous Distance Learning," *SUCCEED 2000 Annual Meeting*, Greensboro, NC, March 28-29, 2000. PowerPoint slides available at <[Midkiff\SUCCEED Conf \(2000 Mar\).ppt](#)>.
- ¹⁷⁶ <http://www.visc.vt.edu/succeed>
- ¹⁷⁷ <http://fiddle.visc.vt.edu/courses/websites/>
- ¹⁷⁸ [Miller\wwitexpo.pdf](#)
- ¹⁷⁹ [Miller\SucceedMBone.ppt](#)
- ¹⁸⁰ [Miller\ALN99.ppt](#)
- ¹⁸¹ Chen, J., M. Ellis, J. Lockhart, S. Hamoush, C. Brawner, and J. Tront. "Technology in Engineering Education: What do the Faculty Know and Want?" *Proc. ASEE 1999*, Charlotte, June 1999.

- ¹⁸² Chen, John C., Mike Ellis, Jason Lockhart, "Faculty Proficiency with Technology: Distribution among Rank and Institution," *Proc. ASEE/FIE 1999*, San Juan, Puerto Rico, session 13c4, pp. 14-19.
- ¹⁸³ Holzer\Active Learning in the Classroom.doc
- ¹⁸⁴ Holzer, S. M. and R. H. Andruet, "Active Learning in the Classroom," *Proceedings, 2000 ASEE-SE Annual Conference*, Roanoke, VA, April 2-4, 2000.
- ¹⁸⁵ Holzer\MSU Workshop Questions.doc
- ¹⁸⁶ Holzer\Minute paper response.doc
- ¹⁸⁷ Look for details when Tom Miller's report is received
- ¹⁸⁸ <http://www.asce.org/exceed/>
- ¹⁸⁹ <http://search.npr.org/cf/cmn/cmnps05fm.cfm?SegID=70733>
- ¹⁹⁰ Reese\Animation1.doc
- ¹⁹¹ Reese\Animation2.doc
- ¹⁹² Reese\Animation3.doc
- ¹⁹³ Reese\FIEFinal.pdf
- ¹⁹⁴ Craddock, James, "Interactive Multimedia Labware for Strength of Materials Laboratory," to appear in Computer Applications in Engineering Education. Available at <Craddock\cd rom.doc>.
- ¹⁹⁵ Craddock, James, "Web Based Laboratory Manuals in Civil Engineering," to be presented at the International Conference on Engineering Education in Taiwan. Available at <Craddock\ICEE2000.doc>.
- ¹⁹⁶ <http://civil.engr.siu.edu/Labs>
- ¹⁹⁷ Craddock, James, "Interactive Multimedia Labware for a Torsion Experiment," to be presented at the 2000 ASEE Conference in St. Louis. Available at <Craddock\ASEE.doc>.
- ¹⁹⁸ Craddock\CE_LAB_Website.ppt
- ¹⁹⁹ <http://www.ce.vt.edu/courses/ce4404/2b51.html>
- ²⁰⁰ Holzer, S.M., and R.H. Andruet, "Experiential Learning in Mechanics with Multimedia," The International Journal for Engineering Education. In press.
- ²⁰¹ Holzer\Guide for Multimedia Statics.doc
- ²⁰² <ftp://www.ce.vt.edu/pub/statics/statics-zip/mle.exe>
- ²⁰³ Zorowski\revised GT presentation.ppt
- ²⁰⁴ Zorowski\Diffusion Paper.ppt
- ²⁰⁵ Zorowski\Diffusion Paper.doc
- ²⁰⁶ Ohland, M.W., and T.J. Anderson, "Studying the Contribution of Programs at Eight Engineering Colleges toward Student Success," *Proc. FIE 1999*, San Juan, Puerto Rico, November 10-14, 1999.
- ²⁰⁷ Ohland, M.W., G. Zhang, F.J. Foreman, and F. Haynes, "The Engineering Concepts Institute: The Foundation of a Comprehensive Minority Student Development Program at the FAMU-FSU College of Engineering," accepted for publication, *Proc. Frontiers in Education 2000*, Kansas City, MO, October, 2000.
- ²⁰⁸ Tolley\com_survey.doc
- ²⁰⁹ Tolley\Studentsurvey00.doc
- ²¹⁰ Tolley\Alumnisurvey00.doc
- ²¹¹ Tolley\FR Learning Outcomes.mdb
- ²¹² Brawner, C., T. Anderson, J. Demery, C. Zorowski, and R. Serow. Closing the Loop: Using Qualitative Assessment in the Continuous Quality Improvement of the SUCCEED Coalition. Proceedings. 1999 American Society of Engineering Education Annual Conference, Charlotte, June 1999. PowerPoint slides available at <Brawner\Closing the Loop.ppt>.
- ²¹³ C. Brawner, C. Zorowski, J. Demery, R. Serow. Qualitative Assessment Case Studies and Coalition Evaluation Evaluation years 6 and 7 Final Report. Southeastern Universities and Colleges Coalition for Engineering Education, 1999. Report is for internal use only; others may request access to portions of the report by contacting Matthew Ohland at ohland@ce.ufl.edu or 352-392-4000.
- ²¹⁴ <http://www.ise.ufl.edu/ipd/sponsors.htm>



U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)



REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

| | |
|--|---------------------------------------|
| Title: SUCCEED (SOUTHEASTERN UNIVERSITY AND COLLEGE COALITION FOR ENGINEERING EDUCATION) ANNUAL REPORT, YEAR 8. | |
| Author(s): MATTHEW W. OHLAND, TIMOTHY J. ANDERSON, EDITORS. | |
| Corporate Source: CLEMSON UNIVERSITY | Publication Date: 4/30/2000 |

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

| |
|---|
| PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY |
| _____ |
| _____ |
| TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) |

1

Level 1



Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) and paper copy.

The sample sticker shown below will be affixed to all Level 2A documents

| |
|--|
| PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY |
| _____ |
| _____ |
| TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) |

2A

Level 2A



Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only

The sample sticker shown below will be affixed to all Level 2B documents

| |
|--|
| PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY |
| _____ |
| _____ |
| TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) |

2B

Level 2B



Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Sign
here,
please

| | |
|---|---|
| Signature: | Printed Name/Position/Title: ASSISTANT MATTHEW W. OHLAND, PROFESSOR, DR. |
| Organization/Address: GENERAL ENGINEERING CLEMSON UNIVERSITY 100-CRIGGS HALL CLEMSON, SC 29634 | Telephone: 864-656-2542 FAX: 864-656-1327 |